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MANCHESTER
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The Journal of Obstetrics and Gynæcology of the British Empire

VOL. 29. No. 1 (New Series). SPRING, 1922

The Manchester School

Charles White (1728—1813) and the Arrest of Puerperal Fever.

Being the first Lloyd Roberts Lecture delivered at the Royal Infirmary, Manchester, October 14th, 1921.

By J. GEORGE ADAMI, C.B.E., F.R.S., M.A., M.D. (Cantab and McGill), Sc.D. (Dublin), LL.D. (Toronto), F.R.C.P. (Lond.), F.R.C.S. (Eng.).

Vice-Chancellor, The University of Liverpool.

By his will the late Dr. David Lloyd Roberts, who died 27th September, 1920, at the ripe age of 86, left to this institution, with which he had been associated for 35 years, the sum of £3,000, and—to quote the will—"an additional sum of £500 upon trust to invest the same, and to apply the income each year in payment of an honorarium for the delivery of a lecture (to be called the 'Lloyd Roberts Lecture') on any subject of medical or scientific interest, each lecture to be delivered by such person in such place and to such persons and subject to such regulations as the institution administering the trust legacy may in its absolute discretion determine."

It is in accordance with that bequest that this afternoon the first of the Lloyd Roberts Lectures is to be delivered. As an old student of the Manchester Medical School, and House Physician of this Infirmary; as one who was a student under Lloyd Roberts, and perhaps more especially as one who is neither an obstetrician nor a gynæcologist, I appreciate greatly the honour that you confer upon me in asking me to inaugurate the series of lectures which will keep green the name and fame of one who in his time was a leading Lancashire obstetrician and gynæcologist. Furthermore, as an old student it touches me closely that you remember me; as one who knew Lloyd Roberts it is good to undertake this pious duty; and, in the third place—although I cannot say for

certain that this is the case in the present instance—often it happens that he who beholds things from outside sees more clearly the trend of affairs than those who are in the very midst of them. Wherefore possibly I who have for so long been away from Manchester, and, indeed, from medical practice, may be able to place before you, practitioners of Manchester and district, with a certain amount of clarity, what the outer world thinks of matters obstetrical and gynæcological here in Manchester.

My first act of piety is to recall to you the memorable person of the donor. He was indeed a personality—a humorist in the sense of Ben Jonson. He was himself, and like no one else in his profession : at once blunt and sharp, as poignantly direct as he could be quizzically evasive ; a Welshman, with all that that implies, yet, before all, a Lancashire man, rough in manner and in matter, but loving and surrounding himself with objects of beauty ; full of wise saws and homely wisdom, so that his sayings have become proverbial ; Doric in speech, yet given to the best in literature, rejoicing above all in the choice phrasing and noble language of the author of "Religio Medici," of which work indeed he published a well-known edition : devoted to his profession, yet shrewd in business—some would say to the limit of shrewdness—careful in small things, yet careless of still smaller—fashions, for example—generous on a large scale, as shown by his will, and not incapable of perversity, a good—or, some would say, a wicked—hater. It was the strength and originality of his character coupled with his knowledge of humanity, and more particularly of femininity, rather than his contributions to the advance of his subject and their originality, that impressed the student, and for long years gave him his very real influence and standing among his colleagues. What he wrote was clear in expression and sound in doctrine, even though, as we students thought in the eighties, that doctrine was not quite the latest. It is marvellous what mixtures we mortals be : it would be difficult to meet with a quainter, more delightful medley than that of which Lloyd Roberts was composed. One's memory of him is, as it were, of a ripe old Burgundy that must have been rough and strong and heady in its youth, that had mellowed until full of aromatic ethers, but that, with all its bouquet, still smacked of the soil.

I think I cannot do better than inaugurate this series of lectures with an historical study, taking as my subject part of that which Lloyd Roberts made the topic of his last important address when President of the Section of Obstetrics and Gynæcology at the Manchester meeting of the British Medical Association in 1902—namely, the Manchester School of Obstetrics and Gynæcology, and its rise.

"Too often," said Lloyd Roberts in his opening remarks, "do we forget those who first force their way along unknown paths which in the future become well frequented thoroughfares; who first point out to what important ends such paths may lead: who persevere through weal and through woe, through opposition and calumny; who never falter in their struggle along the paths they see dimly traced before them, or even when they must needs grope blindly along the absolutely unknown: too often is the honour due to these pioneers pushed into the limbo of obscurity by the very weight and magnitude of the chain, the initial links of which they themselves had helped to forge."

It is but lost labour to attempt to develop either a university or a medical school without local pride and local patriotism, and to establish that pride and that patriotism before all things it is necessary to build up and cherish the history and traditions of the school. What is more, in these days with the ever-increasing burden of new knowledge and new developments that have to be mastered, for right thinking and the appraisal of values, in fact for the pigeon-holing of that new knowledge in its proper place in the brain, it is increasingly essential for teachers as well as for the taught to gain and to possess—if I may be permitted to mix metaphors—a correct historical perspective. Here in your Manchester School of Medicine there is no department that has a finer tradition and history than that of Gynæcology and Obstetrics. You may well be proud of this great new-old Infirmary, of its new and commodious installation, of its old renown. But I would have you remember that the man who was responsible for its foundation will go down to history as a great obstetrician, nay as one of the greatest: Charles White, the friend and fellow student of John Hunter, Charles White, the distinguished surgeon, who first excised the head of the humerus and both articular surfaces of the joint for caries, in place of amputation, and used dried sponge to arrest hæmorrhage a century and more before Sir Victor Horsley. In 1752 White, before he was twenty-four years of age, with the financial support of Mr. Joseph Bancroft, rented a house and converted it into a small hospital, the first public hospital established in Manchester, and carried it on with such success that in 1755 it gave place to a larger new Infirmary of 40 beds with the founder as chief surgeon, a position he held for 38 years. White was thus the creator of the Royal Infirmary, as also he was founder of the first lying-in hospital, now St. Mary's Hospital. In like manner he was the moving spirit in the establishment of the first College for advanced education in the provinces outside the Universities—the College of Arts and Sciences—in which he and his son delivered the courses of lectures in Anatomy.

I am not going to detail to you the life of Charles White: has it not been studied and described in late years by Lloyd Roberts, Cullingworth, Whitehead and Brockbank? Not but that I am strongly tempted, for from my boyhood, when I sat Sunday after Sunday under his memorial tablet in the old parish church at Ashton-upon-Mersey, Charles White has been one of my heroes. Does not his bust in marble form one of the treasures of the Infirmary? In those early days I could only imagine things about one so distinguished that his merits were conveyed to posterity in marble and could but chew the cud of enjoyment over the Johnsonian periodicity of the epitaph of the

Member of the Corporation of Surgeons and
Fellow of the Royal Society
who
After rendering himself eminent in his Profession
for the space of sixty years
by a dexterity and Extent of Knowledge
scarce exceeded by any of his Cotemporaries
retired
to the Enjoyment of rural and domestic Felicity
at Sale within this Parish
He died on the 20th of February, 1813, aged 84.

It may have been a bad model, but I loved the rich roll of that "rural and domestic felicity," and as I grew towards youth I tried to hunt out fuller information about him at Chetham's Library, the Reference Library, and elsewhere, with little success. I did not know how to hunt libraries in those days, and there were few to direct me, few who after sixty years or so knew anything about him. It was only in later years, through the late Professor Cullingworth, that I obtained full knowledge of his life's work. The medical history of Manchester may well be said to begin with him.

What I want to impress upon you is that great as is Manchester's debt to him, he will be remembered in medical history for his work as an obstetrician. I referred a few moments ago to the importance of a proper historical perspective for teachers as well as for students. You may imagine my disgust a few years ago when a certain able and worthy knight, now no more, who held the Chair of Obstetrics and Gynæcology in the University of Manchester, published a very complete life of the Hungarian Professor of Obstetrics, Semmelweiss;[1] published it that he might establish among English-

1. *Semmelweis, I. P., His Life and Doctrine: a chapter in the History of Medicine.* By Sir William J. Sinclair, M.A., M.D. Manchester: At the University Press, 1909.

speaking people a due recognition of Semmelweis's position as the pioneer in establishing the true nature of puerperal fever and the right means of prophylaxis, claiming for him that "in the whole history of Medicine we find a clear record of only two discoveries of the highest importance in producing direct and immediate blessings to the human race by the saving of life and the prevention of suffering,"[1] those, namely of Edward Jenner and Ignaz Phillip Semmelweis.

Such a statement is that of a special pleader. What about the discovery of anæsthetics, the work of Pasteur and of Lister, and the discovery of diphtheria antitoxin? Were Sir William alive I might speak more strongly. Nevertheless, when the head of a school belittles the founder of that school the maxim "De mortuis . . . ." does not apply. Yet, let me assure you, that it is not that I want to attack Sinclair, far from it, but in order to give honour where honour is due it is essential that Sinclair's work should be criticized and corrected. The whole volume, indeed, is one of unreasoning advocacy, in which in order to establish his point the author throughout minimizes the notable work accomplished by British obstetricians long years before Semmelweis came on the scene, and in particular so minimizes the work of Charles White as to make it appear that his references are second-hand, that he, Professor of Obstetrics in Manchester, has not been familiar with that remarkable work of a Manchester obstetrician, "The Management of Pregnant and Lying-in Women, and the means of curing, more especially of preventing, the principal disorders to which they are liable." This is a treatise that in its day had a remarkable influence. First published in 1773, within twenty years there were no less than five editions.

The book was translated into French in the year of its first publication, and into German within two years, and was reprinted at Worcester, Massachusetts, in 1793. Of all men, it may be said, Sinclair should have had knowledge of this work. Had he been familiar with it he could not have given to Kirkland[2] the credit for procedure and treatment that had been made public a year previously by Charles White. But then Kirkland was apparently a Scot,[3] and the perfervour with which Scottish obstetricians are treated throughout Sinclair's work save where, as in Gordon's case,

1. *Loc. cit.*, p. 1.

2. Kirkland, T., M.D. *A Treatise on Childbed Fevers and the Methods of Preventing Them.* London, 1774.

3. "We may presume that Kirkland was a Scotsman from Glasgow or Lanarkshire, attracted to London by the fame of Smellie and the two Hunters." Sinclair, *loc. cit.*, p. 339. As a matter of fact Kirkland (1722—1798) graduated M.D. at St. Andrews in 1769.

they anticipated Semmelweis, and the way in which, in comparison, English work and English obstetricians are belittled, can only in the circumstances be ascribed to an intellect that has come to lack poise through advancing age and the inevitable changes associated therewith. When one remembers Sir William's concise contributions to his subject in the earlier days, and his notable influence in the organization and development of the school, the book under discussion appears extraordinarily one-sided, strikingly lacking in grasp and in the orderly presentation of its subject, and to defeat its object by its very prolixity. In this matter of Kirkland, for example, Sir William deals with him before White, but fails to notice that Kirkland's book was in fact due to White's direct appeal, and, what is more, that it was dedicated to him.

It is a pathetic yet irritating picture that Sinclair draws of Semmelweis, of a man who was his own worst enemy: with a passion for work and a tender heart for his patients, but so imperfectly educated that he, an Hungarian living in Vienna, never mastered the German tongue. Too proud to acknowledge his weakness and obtain help from others, for long years he refrained from publishing his results. He was content to have friends like Skoda and Hebra write on his behalf; he was either too loyal or too heedless to complain or correct when they, not unnaturally, published incomplete statements, yet he was foolishly indignant when others at a distance, basing their contributions on these imperfect representations of his views, were unable to accept them as an adequate survey of the whole ground. After four years Semmelweis gave a full description of his work and stated his conclusions before the Vienna Medical Society, but then instead of handing in his paper for publication, he left it to the Secretary to publish an epitomized report, with the result that usually follows. Surely it is not the fault of the medical world if in these circumstances it failed to grasp the full significance of Semmelweis's message, and paid scant attention to his "Aetiologie" when it at last appeared, badly arranged, indescribably diffuse and argumentative, with constant digressions and withal written in the style of the scrivener with wearisome iteration of phrase that out-Daniels Daniel in that chapter upon the Miracle of the Three Holy Children with its recurrent "trumpets, sackbuts and shawms." Add to this that on reading the book it is clear that, despite the remarkable reduction in the mortality from puerperal fever that Semmelweis accomplished in lying-in wards of the Allegemeines Krankenhaus in Vienna, he was never able to reduce the death-rate there to that of his predecessor Boër. Boër it was, who, on his appointment as Professor of Midwifery in 1789, introduced the methods he had learned in England. In the thirty years during

which Boër held the post 65,000 patients came under him in the Lying-in Hospital, with an average annual mortality of 1.3 per cent. That for his last year was 0.8 per cent. Under Klein, Boër's successor, the mortality rose the first year to 7.8 per cent., and usually remained high, sometimes being appalling, rising in some months to 20.84 and 29.33 per cent.[1] In one division of the hospital the mortality from puerperal fever during the years 1841—1846 inclusive, varied between 6.8 and 15.8 per cent.; the average for 20,402 cases during the six years was just under 10 per 100. During Semmelweis's regime in the year 1848 the death-rate among 3,556 patients fell, in this same division, to 1.27 per cent. In his first year at Pesth, it is true that Semmelweis's mortality was only 2 out of 514 patients, or just under 0.4 per cent., but in the next two years it rose to 2.8 and 4.0 per cent.

Yet Sinclair, while he gives these facts, makes no comment upon them and draws no deductions. He does not, or will not, see that practically all that Semmelweis accomplished was to demonstrate absolutely that the main cause of the appalling incidence of puerperal fever in the Vienna Lying-in Hospitals was want of cleanliness, and especially in regard to the practice of allowing students, after they had come straight from the post-mortem room, to examine the patients without first adequately cleansing their hands.[2] He admitted other modes of infection, such as neglect to employ clean bed-linen, the presence of open suppurating wounds in neighbouring beds, and "self-intoxication," that is, the lochia, remnants of decidua and blood coagula which are retained may undergo decomposition and when absorption occurs produce puerperal fever.[3] It has, nevertheless, to be admitted that Semmelweis's methods, in his own hands, were incapable of preventing all the modes of conveyance. He was, for example, helpless in the group of cases of "self-intoxication," and in this respect his teaching was far behind that of Charles White. His great achievement was in the demonstration of the value of antiseptic treatment of the hands of the examiner, and recognition of the supreme virtue of chlorine preparations, and foremost among these of a solution of bleaching powder. But even in this he had been anticipated by British obstetricians.

It is human to imagine that there were no Greeks before Agamemnon, no antiseptic treatment before Lister. But in its

1. Sinclair, Sir W., *loc. cit.*, pp. 51, 55, and 33.

2. Semmelweis regards his Table XVII (*Ætiologie*, p. 62) as affording "an irrefragable proof of my opinion that puerperal fever originates in the carrying over (Uebertragung) of decomposed animal-organic matter; . . . . when the Vienna School adopted the anatomical basis of instruction the unfavourable health condition of the lying-in women began."

3. Sinclair, Sir W., *loc. cit.*, p. 205.

prime sense of that which hinders sepsis, or putrefaction, the word "antisepsis" was in use in 1751,[1] and was employed by James Lind,[2] the pioneer in naval hygiene in 1757, by Charles White[3] and T. Henry[4] in 1773, by Joseph Priestley[5] and Thomas Kirkland[6] in 1774. White, in particular, draws attention to the part played by retained lochia in producing puerperal sepsis. Foul air and surroundings, filthy bedding, as well as the retention of the lochia and the excreta, are in his opinion primary causes of the appearance of puerperal fever. "The danger does not arise from the smallness of the quantity of the discharge, but from its stagnation whereby it becomes putrid and in this state is absorbed into the circulation."

Kirkland has similar views, holding that inflammation of the uterus and a consequent absorption of putrid matter from this organ will bring on puerperal fever. Regarding one of his cases he states: "I should indeed have been glad if the uterus could have been washed out with antiseptic injections, but this from a variety of obstacles is seldom practised." In the second edition of his book (1777) White advised that whenever the lochia became offensive, warm water should be frequently injected into the uterus by means of a syringe "which had a thick siphon and was a little curved." In the third edition (1784) occurs the passage concluding the chapter upon treatment to which in his address Lloyd Roberts drew particular attention: "I must not omit to mention in this place the good effects I have experienced from emollient or antiseptic injections into the uterus, by means of a large ivory syringe or an elastic vegetable bottle. In those cases where the lochia have become acrid or putrid and, by being absorbed into the circulation, have served as a constant fomes for the disease, I have by this means known the fever much assuaged, and in many cases wholly extinguished; for though, as I have before observed, the quantity of the lochia is not to be much regarded, the quality of this discharge is a matter of infinite importance."

He held so strong a belief in the damage of retained discharges that just as surgeons the world over to-day practice free drainage

1. *Gentleman's Magazine*, quoted in the New Oxford Dictionary.

2. Lind, J. *An Essay on the Most Effectual Means of Preserving the Health of Seamen in the Royal Navy* (antiseptic sprinklings, aromatic fumes), pp. 60 and 86. London, 1757.

3. White, C. *The Management of Pregnant and Lying-in Women*, 1773, pp. 173, 174.

4. Henry, Thomas. "On the Comparative Antiseptic Powers of Vegetable Infusions prepared with Lime," in his *Experiments and Observations*. London, 1773.

5. Priestley, J. *Observations on Air*, p. 228.

6. Kirkland, T. *A Treatise on Childbed Fevers and the Methods of Preventing them*. London, 1774.

and place the patient in such a posture that this free drainage is favoured, so he recommended that so soon as possible after delivery the patient be made to sit up or be placed in a reclining position to the end that the discharges from the womb gain a free exit and are not retained so as to undergo putrefactive changes, and, what is more, that she should get up and about in the second or third day at the latest.

This teaching of White's has of recent years been rediscussed, and is again coming to the fore in the practice of some obstetricians. White, in short, demonstrated seventy years before Semmelweis how to guard against and prevent that self-infection which the latter regarded as forming the residuum of cases of puerperal fever, which he was powerless to prevent. Further, Charles White was so successful in his practice that he was able to say that in his extensive experience of more than twenty years, while cases of puerperal fever had occurred through non-observance of the rules he had laid down, he had never lost a single patient of this disease.

As to the extent of his experience, it must be remembered that for many years after commencing practice he had the care of all the parish poor, not only of Manchester, but of a large district around it, herein succeeding his father, Dr. Thomas White, who had particularly interested himself in midwifery.

Nay more, as my old friend, the late Dr. Cullingworth, has pointed out, he had enlightened views as to the nature of the disease. "Every surgeon," writes White, "conversant with his business, knows that a rapid pulse [*i.e.*, fever] never fails to attend absorption of matter from abscesses or ulcers, whatever be the other concomitant symptoms. . . . . If to these considerations we add that, as the puerperal fever is more fatal in large cities and crowded hospitals than in places where the air is more open and pure, so is the fever occasioned by the absorption of matter . . . . . (and) that as the puerperal fever does not appear till after delivery, so neither does absorption of matter from an abscess till it be opened and the air have access, we may, I think, conclude that the absorption of matter is the immediate cause of the puerperal as well as of that consequent upon abscesses and ulcers." In other words, White recognized, long before Sir James Simpson wrote his classical essay on the subject (1850),[1] the close analogy between the fever that followed surgical operations (and the ulceration of wounds) and the fever to which lying-in women are liable.[2]

But Sinclair took no note of all this. He gives three and

1. Simpson, Sir J. "Some notes upon the Analogy between Surgical Fever and Puerperal Fever." *Monthly Journ. of Med. Science*, Edinburgh, 1850.

2. See C. J. Cullingworth. *Charles White, F.R.S.* London, 1904, p. 28.

a half pages to Kirkland, half a page to White, referring to 'one point alone' as worth recalling in White's prophylaxis, namely, early sitting up. He cannot have studied the original or he would have recognized that White laid equal importance with Semmelweis upon the decomposition and putrefaction of the uterine contents, and upon the relationship between puerperal fever and 'pyæmia.' Seventy years before Semmelweis, the English school of obstetricians were showing how to combat puerperal fever with a success at least equal to that of Semmelweis; and Charles White, of Manchester, developing and publishing the practice of his father, Thomas White, was the leader in the revolution. White's system was that of absolute cleanliness in all the surroundings of the patient. "Her lying-in chamber to be in every respect as sweet, as clean, and as free from any disagreeable smell as any other part of the house; the room is to be brushed every day, and the carpets taken out to be cleaned and aired; the patient is to be often supplied with clean linen, and clean well-aired sheets are to be laid upon the bed. The windows are to be opened . . . . no board or other contrivance to block up the chimney, the curtains not to be closely drawn. In hospitals, if separate apartments cannot be allowed to every patient, at least as soon as the fever has seized one she ought immediately to be moved into another room, not only for her immediate safety, but that of the other patients; or it would be still better if every woman were delivered in a separate ward, and was to remain there a week of ten days, until all danger of this fever is over." The diet is to be simple, the bowels kept open, and alcohol is to be eschewed. Whenever a patient has recovered from this fever and is removed to another room, the bedding and curtains should be washed, the floor and woodwork should be cleansed with vinegar, and it would add to the salubrity of the apartment if it were stoved with brimstone.

We see the influence of White's teaching in that first important report [1] from the Rotunda Hospital, Dublin, that of Robert Collins, for the period of his mastership, 1826 to 1833, long years before Semmelweis. It is only during this century that the bacteriologists have by experiment determined that nascent chlorine is the most rapid and effective of all disinfectants when organic matter is present, and actually during the War that we have had developed the methods of wound treatment by nascent chlorine of Lorraine Smith and Dakin. With our existing knowledge and satisfaction over our accomplishments, it is hard to believe that what I am going to quote was written eighty-five years ago: it sounds so modern.

1. *A Practical Treatise on Midwifery, containing the result of 16,654 Births occurring in the Dublin Lying-in Hospital during a period of seven years, commencing November 1826.* London, 1835.

Collins entered upon his mastership at the end of 1826, after puerperal fever had prevailed to an alarming extent. In 1827 the disease was slight; in 1828 the fever was much more severe, proving fatal to 21 women, and it continued to increase in violence in January and February and the beginning of March 1829. In February he had all the wards in rotation filled with chlorine gas in a very condensed form for the space of 48 hours, during which time the windows, doors, and fireplaces were closed so as to prevent its escape as much as possible. The floors and all the woodwork were then covered with the chloride of lime, mixed with water to the consistence of cream for 48 hours. The woodwork was then painted, and the walls and ceilings washed with fresh lime. The blankets and similar articles were in most instances scoured, and all stoved to a temperature of between 120° and 130°.

"From the time this was completed until the termination of my Mastership in November, 1833, we did not lose one patient by this disease. As the wards of the Hospital are occupied by the patients in rotation, as soon as each in succession was vacated I continued the use of the chloride of lime, confining its application to the floors. In this way each ward was washed every 10 or 12 days, the solution being left undisturbed for 24 hours, during which time the blankets, quilts, linen, etc., were suspended, so as to be exposed completely to the chlorine gas, which is copiously disengaged from the preparation mentioned."

He then proceeds to describe his care in regard to the ventilation of the wards, exactly along the lines of Charles White's recommendations; with him he enjoined that the ventilation be put beyond interruption on the part of nurses or patients, by the provision of ventilation holes in the ceilings, through the upper sashes of the windows and over the doors.

White was an ardent believer in fresh air. He recommends the building of special lying-in wards, "so contrived that the air might be kept in constant circulation, in such a manner that there would be no danger of the creation or communication of this disorder."

"The rooms must be lofty, open galleries with unglazed windows should run through the whole buildings. The wards should be all upon the centre floors, and they should have no doors except into the galleries, and those doors should be opposite to the windows in the wards, that there may be a thorough ventilation of air when the windows are opened. In the upper part of the doors should be several holes to let out the foul air. . . . .

"An entire apartment should be allotted to every patient, or else if large wards were constructed the windows should be placed

very high, with the uppermost sashes made to let down. Large apertures should be made as high as possible in the partition wall which divides the wards from the gallery, after the manner of the Leicester Infirmary; and in the upper part of some of the windows the furthest from the fire should be fixed a few leaden lattices to admit fresh air, or, what is still better, circular, or as they are called by some, Æolian ventilators. I do not suppose that the superior advantages of these ventilators over a leaden lattice consists in admitting more fresh, or extracting more foul air; but by their circulatory motion they prevent the air from rushing directly upon the persons in the room, and thereby giving them cold. They should be kept open night and day, that a constant circulation of air may be maintained; for it will not be sufficient if a door or even a window is opened a little in the middle of the day only, of which whoever will take the trouble to go into a ward of an hospital early in a morning will thoroughly be convinced, the air having been rendered so foul and disagreeable by a number of people breathing in it the whole night, as to make the atmosphere very unwholesome, not only to lying-in women, but to any other person.

"Several air-pipes made of wood of about six inches diameter fixed in every ward, and passing through the ceiling and roof, have been found very useful in the Manchester Infirmary. I have been in a great number of hospitals, but I do not know any so free from foul air as that Infirmary, which may, I think, be easily accounted for. . . . . In the galleries and in many of the wards lead lattices are fixed in the windows. Holes are cut in the upper part of the doors, and the doors are generally open in the daytime. In the largest wards are openings in the wall likewise to admit fresh air. . . . .

"Besides air-pipes carried through the roof, others may be let into the chimney of the ward above, as has been practised in St. George's Hospital." [1]

At the Rotunda, Collins carefully copied most of White's recommendations, and he states:—"Of 10,785 patients delivered in the Hospital subsequent to this period only 58 died, which is nearly in the proportion of *one* in every *one hundred and eighty-six*, the lowest mortality perhaps on record." That is 0.53 per cent. mortality, and this not from puerperal fever. To repeat, there was not one death from that disease. It was from all other causes. I doubt if even to-day, with our full development of asepsis, any French, German or Austrian Maternity Hospital can show very much better figures. And this was thirty years before Pasteur founded the science of bacteriology and established the microbic nature of infection, thirty-five years before Lister

1. Charles White, *loc. cit.*, 1st edition, pp. 162—167.

introduced antiseptic methods into surgery and fifteen or more years before Semmelweis. Moreover, Semmelweis never obtained such results. I admit that, granting the time and the place, Semmelweis's results were notable and most striking; but they were not original. I admit also, and freely, that by the early forties other influences were at work in Great Britain, that Charles White's great work had become old-fashioned and forgotten, and his methods had lapsed, even here in Manchester itself, so that puerperal fever again raised its head, and the mortality at St. Mary's Hospital became a matter of the gravest concern. This fact, however, must not be laid to White's account, but to the diffusion of foreign, and particularly French, teaching as to the nature of puerperal fever and its epidemic character. It was the later appearance of that same wave of erroneous 'epidemic' doctrine obtaining on the Continent, which in 1826, on the ground that his procedure was old-fashioned and based on 'contagionism' had at Vienna forced the resignation of Professor Boër and had led to the disastrous introduction of Professor Klein and his 'anatomical' teaching into the Allegemeines Krankenhaus.

Let us once for all analyse and present Semmelweis's teaching. It is this, as stated in the *Ætiologie*, the ultimate full statement of his theory and practice, published in 1860. (Sinclair, pp. 202 *et seq.*):—

"Puerperal fever is not a contagious disease, but puerperal fever is conveyable from a sick to a sound puerpera by means of a decomposed animal organic material.

"I maintain that puerperal fever, without the exception of a single case, is a resorptive fever produced by the resorption of a decomposed animal organic material. . . . . (This) is, in the overwhelming majority of cases, brought to the individual from without; these are the cases which represent childbed fever epidemics; these are the cases which can be prevented.

"In rare cases the decomposed animal matter which when absorbed causes childbed fever is produced within the limits of the affected organism. . . . .

"The sources of the decomposed animal organic material which conveyed from without, causes puerperal fever are all diseases . . . if only the disease in its progress produces a decomposed animal organic material . . . . . only the decomposed animal organic material as a disease producer has to be taken into consideration. . . . . What the object actually represents is of no importance; it is the degree of putridity which has to be considered.

"The carrier of the decomposed animal organic material is everything that can be rendered unclean by such material and then comes into contact with the genitals of the patient. . . . . .

"Puerperal fever is therefore not a species of disease (*i.e.*, a specific disease) (but) a variety of pyæmia. . . . . I understand by pyæmia blood-poisoning produced by decomposing animal organic matter. . . . This disease can be produced in a normal healthy puerpera by a disease which is not puerperal fever. . . . .

"There are no epidemic influences capable of producing puerperal fever . . . . epidemic, that is to say, atmospheric, cosmic, telluric influences. . . . . If (it) were produced by (such epidemic influences) it could not be prevented . . . . (it is not bound up with any season in particular . . ., p. 217). The medical profession in England regard puerperal fever as contagious. . . . . That puerperal fever is not contagious is my belief.

"But puerperal fever is conveyable (uebertragbar) . . . . but only from those infected women who produce decomposed material. After death (it) is conveyable from every cadaver of a puerpera to a healthy individual when the cadaver has reached the necessary degree of decomposition (p. 224).

"The task of prophylaxis of puerperal fever must consist in preventing the access of decomposed material from without, the arrest of the development of such material within the organism, and the removal as quickly as possible from the organism of such a material so as to prevent its resorption.

"All pathological anatomy and even surgical work in the curriculum should be finished before the practice of midwifery has begun.

"The conveyer of the decomposed matter may also be the air. Hence free ventilation is necessary (so as to prevent the development of a puerperal miasma). Isolation rooms should be provided.

"As regards 'self-infection,' if decomposed material has actually been produced in the individual it must be at once got rid of by cleanliness and injections so as to prevent resorption as far as possible."

Leaving aside for the time being Semmelweis's doctrine of decomposed animal organic material, the only serious difference between the English school as represented by the obstetricians at the end of the eighteenth century and Semmelweis in the middle of the nineteenth, is that the one believed in contagion, the other in Uebertragung. Instead of showing, as he ought to have done, that with our present knowledge of the nature of puerperal fever, this is a distinction without a difference, Sinclair solemnly and unbelievably emphasized that the distinction is all important.

So far as I can discover, from 1774 to 1840 no British writer of the first rate claimed that puerperal fever was a specific disease. While some pointed out the close relationship of this condition with erysipelas, others with scarlet fever, and others again, like

Charles White, with jail fever, or, like Collins and the earlier workers in Dublin, with typhus, not one of them claimed that all cases were erysipelas or scarlet fever or typhus. From the time of Gordon,[1] of Aberdeen, onwards, it was recognized that those who had been in contact with, or in attendance upon, cases of puerperal fever might convey the condition to other puerperal women. What is that but Uebertragung? As I have pointed out, the doctrine of self-infection admitted by Semmelweis goes back to Charles White.

We in the medical profession are the slaves of words of indefinite meaning, words which cloak our ignorance and are a curse to clear thinking, words such as 'contagion,' 'septicæmia' and 'pyæmia.' To some of us at certain periods 'contagion' has meant the direct conveyance of infection by immediate *contact* between the infected individual and one hitherto not infected. To others at the same time or at other periods it has meant infection transmitted by any means and through any intermediary; to others again 'contagion' implies, and Sinclair employs the word in this sense, infection by a sharply defined species of disease, however conveyed. Semmelweis could not use the term 'contagion' simply because he did not believe that puerperal fever was an infection: for him it was an intoxication set up by decomposed animal matter. We may admit that it was not his fault that he was wrong, and that had he lived thirty years later he would have been eager to embrace the knowledge of the microbic causation of the condition. The fact remains, however, that the contagionists, so-called, were nearer to the truth than he: they at least saw that they dealt with an infectious condition or conditions. Yet Sinclair, in 1909, preferred to err with him rather than to embrace the truth with his fellow obstetricians in Great Britain.

For some reason or another the late Professor Sinclair either had little appreciation of bacteriology or found it to his interests to act as advocate for Semmelweis and to carp at modern investigation. So little apparent acquaintance had he with scientific progress that, in 1909, he asserts that the discussion on the ætiology and nature of Puerperal Infections at the International Congress at Paris in 1900 presented all the ascertained knowledge of the bacteriology of puerperal sepsis up to a period nine years later than the date of the Congress, stating that "nothing of essential importance had been added to this department of bacteriological knowledge" (p. 364), and making the statement elsewhere that "the very latest question raised in the confused tug-of-war" is with regard to the "hæmolytic influence of the streptococcus," by which I presume he meant "the special virulence of hæmolytic members of the streptococcus group."

1. Gordon. "*On the Epidemic Puerperal Fever in Aberdeen*," 1795.

Yet, as the late Dr. Arnold Lea,[1] a member of Sir William's own staff, showed in his important work, written a few months later, the studies upon streptococci and upon their relationship to puerperal fever have solved the problem of the ætiology of the disease. Briefly, then, it may be stated :

1. Putrefaction is essentially caused by bacteria, so that the 'Uebertragung' of decomposed animal organic material meant always the conveyance of bacteria.

2. Not all the organisms that set up decomposition of animal matter are by any means necessarily pathogenic.

3. Not every case of conveyance of cadaveric material will therefore cause infection of the puerperal uterus or other wounded surface.

4. The organisms which most frequently cause terminal infections, which therefore are most frequently present post-mortem, are members of the streptococcus group; these at the same time are the commonest saprophytes on the skin and mucous membranes of the body.

5. So long as the skin and mucous membranes are intact, for so long may streptococci and other microbes of a highly virulent nature persist on the unbroken surfaces without setting up disease.

6. The organisms which in an overwhelming majority of cases set up and are found associated with puerperal fever, are members of the streptococcus group, and of these again the overwhelming majority are of the hæmolytic variety. As with wounds in general, other organisms may be present and may preponderate or be in practically pure culture in the blood and tissues, notably, staphylococci, *B. coli*, strains of pneumococcus, and *B. pyogenes*.

7. Streptococci, both hæmolytic and non-hæmolytic, and the other micro-organisms above mentioned, may be present in the vagina of the pregnant woman. These organisms explain 'self-infection.' That every puerperal woman does not suffer from 'wound fever' is probably prevented by the bactericidal action of the effused blood.

8. Stagnation of the lochia without free drainage is known to favour bacterial multiplication and so infection of the placental site. Hence the sound wisdom of Charles White's principle of womb-drainage. The argument that early sitting up favours uterine thrombosis is not valid. Such thrombi are of bacterial causation and proper drainage, by preventing infection, prevents thrombosis.

9. Not only do streptococci vary greatly in virulence, but, as

1. Lea, Arnold W. W., M.D., B.Sc., F.R.C.S. (Lecturer in Gynæcology and Obstetrics, University of Manchester, Asst. Surgeon to St. Mary's Hospital). *Puerperal Infection.* Oxford Medical Publications, 1910.

Marmorek and others have shown, their virulence and hæmolytic activity may be increased at a rapid rate by passage through animals in series; that is to say, during the sojourn in the body of the animal there may be definite increase in virulence. Further, growth in confined spaces under favourable conditions favours increase in virulence.

10. No bacteriologist of standing for the last fifteen years has seriously supported the view that there is a distinct species of streptococcus, *S. erysipelatos*. There may well therefore be a correlationship between frequency of cases of erysipelas in a district and frequency of cases of puerperal fever.

11. Similarly the scarlatinal sore throat—as also the diphtherial—is characterised by most abundant growth of streptococci, usually hæmolytic in character. Several observers have therefore held that a streptococcus is the cause of scarlet fever, just as prior to the discovery of *B. diphtheriæ* the same organism was held to be the cause of diphtheria. This is frequently true of other zymotic diseases in which the throat is affected. We can thus understand the correlationship that has been suggested between these diseases and puerperal fever.

Now much, if not all, of this knowledge was at the disposal of Sir William Sinclair twelve years ago, and I cannot but feel that in his desire, however kindly, to exalt Semmelweis he unduly and unpardonably neglected it, to the injury of the great work accomplished by British obstetricians at the end of the eighteenth and beginning of the nineteenth century. They it was, and not Semmelweis, who first gained control over puerperal fever. They it was who introduced free ventilation and as absolute a cleanliness as was possible into the lying-in ward and lying-in room, who laid stress upon disinfection, who realized the value of antiseptics long years before Lister, who recognized the worth of chlorine and chloride of lime, who introduced the disinfection of the hands[1]

1. Semmelweis indeed admits this, and the admission is not a little to the point (Sinclair, *loc. cit.*, p. 218) :—

"English practitioners, starting with the conviction that puerperal fever is contagious, do not visit a healthy pregnant, parturient or puerperal woman when they have paid a visit to an infected pregnant, parturient or puerperal patient, *without previously disinfecting their hands with chlorine disinfectant* (the italics are mine), and without changing their clothes; and when the number of puerperal cases increases in their practice they go away from home or completely abandon midwifery practice for a time. The English practitioner, if he must undertake the post-mortem examination of a patient who has died from puerperal fever, never visits a normal parturient or puerperal woman without first pushing the same precautions to the fullest extent.

"In every case in which the infected puerpera produces a decomposed material, the English practitioners do something *which is superfluous but not harmful*; they

and drainage of the puerperal womb, who would have no truck with the epidemic—that is, the atmospheric, cosmic, or telluric —theory but held to the contagious, that is to say infective, theory of the origin of the disease, and, holding that, saw the condition was preventible and so must be prevented.

There could in short be no more flagrant example than is afforded by Sinclair's work of that altogether too common tendency to exalt the work of the foreigner at the expense of the honest pioneer labour of one's own countrymen. When we analyze Semmelweis's claim we find that through his careful analysis of the mortality statistics of the Vienna Lying-in Hospital he demonstrated that puerperal fever could be set up by the infected hands of those who had been conducting autopsies or dealing with infected surgical cases, and that by disinfection of the hands and the prohibition of post-mortem work during attendance in the wards, he was able to bring the morbidity and the mortality in his wards back almost, but not quite, to what they had been a quarter of a century earlier under the British methods pursued by his predecessor Boër—only this and nothing more: his influence was great in resuscitating the former correct procedure.

The real pioneers in the reduction of puerperal fever were the British obstetricians of the latter half of the eighteenth century in London, Manchester and Dublin, men like Denman,[1] Kirkland, the Whites, Ould and Joseph Clarke; and among these assuredly Charles White, the founder of this Infirmary and of what is now St. Mary's Hospital, takes the first place. I can only repeat to-day what the learned Dr. Thomas Henry, F.R.S. ('Magnesia Henry') said concerning White's *magnum opus* in his obituary memoir read to the Manchester Literary and Philosophical Society in April 1813: "Perhaps, indeed, few medical books have been productive of more important reform in practice, or of more comfort and safety to the

1. While Thomas Denman was the leading "man-midwife" of his time in London, and wrote upon puerperal fever five years before White, his *Essays on the Puerperfal Fever and Puerperal Convulsions* (London, 1768) contains little that is original. He gives "rising too soon after delivery" as an immediate cause of the condition, is fearful of obstructing perspiration, and favours the plentiful employment of "warm diluents animated with a small quantity of brandy or some volatile spirit" (p. 24).

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destroy the decomposed material in the belief that they are destroying a contagion which would cause puerperal fever if carried to a healthy parturient or puerperal woman."

And the English practitioners were right and Semmelweis was wrong. But Sinclair never admits this. If practice has been altered it has been because now we know more concerning hand disinfection and its difficulties, and the value of rubber gloves, and certainly not as a consequence of Semmelweis's teaching.

subjects for whose benefit it was intended. Nature was restored to the free exercise of her operations, and officious ignorance was prevented from converting into fatal disease what was benevolently and wisely designed to be a process scarcely ever attended with danger."[1]

And from White onward there has been an able succession of great obstetricians here in Manchester: Hull (1761—1843), who, along with White, established phlegmatia (or phlegmasia) alba dolens as a definite entity, and laid down clearly the conditions under which Cæsarean section should be undertaken; Wood (1785—1830), who was the first to advise that in placenta prævia the entire detachment of the placenta from the os and cervix uteri should be practised; Thomas Radford (1793—1881), one of the first in this country to propose ovariotomy, and a strong supporter of Charles Clay (1801—1893), who may fairly be regarded as the father of ovariotomy in Europe (Clay's first case occurred in 1829, and in 1865 he was able to report 111 cases of the operation, 77 of which were successful); John Roberton (1797—1876), of the forceps and the studies upon puberty; James Thorburn (1834—1885), first Professor of Obstetrics and Gynæcology at Owens College, author of a practical treatise on the Diseases of Women—a great teacher; and Charles J. Cullingworth (1841—1908), with his studies upon ectopic gestation and pelvic peritonitis, who succeeded him.

It is a noteworthy list, of which Manchester may well be proud, nor has the succession ceased. To-day, under Donald and Fothergill, as all who have followed this last year's medical journals cannot but realize. the school is as vigorous as ever.

One last word. It is for this generation to make the School not local but Imperial in scope, and, like Dublin with its Rotunda, to attract students from all parts of the Empire.

Unlike most other Medical Schools known to me in Great Britain and America, you here in Manchester have developed a most successful post-graduate course of the old type—a course of lectures and demonstrations upon the newer developments in medicine and surgery. You are the centre of perhaps the most densely populated area of the civilized world, and there is a sufficient number of practitioners in your immediate neighbourhood who find it possible to attend these courses without grave disturbance to their practice. And this is all to the good. But let me point out to you that this is not post-graduate work of the higher type. At most these are ' refresher ' courses. They are not calculated for the full education of the specialist in his speciality. They do not—they ought not to—attract men from a distance to Manchester for advanced work of the highest type. However great the utility of

1. *Trans. Lit. and Phil. Soc. Manchester*, Series 2, Vol. 3, 1819, p. 44.

the present courses they are not such either in length, or ground covered, or practical training, as to entitle a man to consider them as affording a qualification for special practice.

Nevertheless there is to-day a distinct demand for this more advanced and expert post-graduate work, for work of the type that in the past was provided by Vienna and Berlin. For myself, indeed, I look forward to the time when we shall cut the Gordian knot of the problem of medical education by shortening and simplifying, and not by lengthening and further complicating, the course leading to the first qualifying examination: when we shall grant the M.B. to the man who has been given instruction in the general principles and ordinary practice of Medicine, Surgery and Obstetrics: shall demand then that every graduate who intends to take up general practice shall spend a year in hospital prior to being given his licence to practice, while those ambitious to take up special work in the medical sciences (anatomy, physiology, pathology, etc.) or in medicine, surgery, gynæcology and the specialities, shall be required to give not one but two years to advanced work in the medical school and hospital combined, in one or other particular direction, leading to a diploma or, if thought fit, a Master or Doctor's degree.

This parenthetically. In the meantime it is for those medical centres which possess particular schools or departments well-equipped and with a reputation and tradition in teaching and research to make use of those particular schools, encouraging those from outside and overseas to take advantage of the opportunities they afford. It would be futile for any British School of Medicine to invite post-graduate students to attend special courses extending over two years or so in every branch of medicine and surgery; men will only be attracted by teachers of repute. Liverpool, for example, with the established tradition of Thomas and his nephew Sir Robert Jones, is offering to medical graduates of approved universities an intensive course of lectures, laboratory and hospital work, of fifteen months in orthopædics, beginning in October of one year and extending through the Long Vacation to December of the next; a course leading to a second degree of Bachelor of Orthopædic Surgery. With its continuing tradition and abundant clinical facilities why should not Manchester offer a similar course in obstetrics, or more broadly, in gynæcology? The other two great branches of our common subject have their degrees. I suggest that the time is ripe for the development here,in the school of Charles White, Hall, Clay, Radford, Roberton, Thorburn, Cullingworth and Lloyd Roberts, of a post-graduate course of such high order that the possession of the Manchester degree in gynæcology should in itself stamp the possessor as a fully qualified expert.

Some Chemical Observations on the Toxæmias of Pregnancy.

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The following observations are not concerned with the ætiology of eclampsia and the allied toxæmias of pregnancy, but are the results of an attempt to estimate the value of chemical methods of investigation in this group of diseases. Knowing as we do, from post mortem findings, that the brunt of the damage in this condition falls upon the liver and kidneys, the question arises as to what extent we are able, by chemical examination of the functions of these organs during life, to arrive at definite knowledge of the extent and progress of the lesion. Criteria, by which we may estimate the gravity of the disease, are especially desirable in the toxæmias of pregnancy, since, by induction of labour, we can arrest the course of the disease and avert permanent damage to the maternal organs, or even a fatal issue. Though a considerable literature of the subject already exists, the conclusions arrived at are conflicting, and have, as yet, but little application in practice. No excuse, therefore, appears to be needed for the publication of the following observations, even though the data presented are based on a limited number of cases, and though the conclusions drawn from them must, on that account, be, to some extent, tentative.

Before proceeding further it is necessary to discuss briefly the available methods of estimating renal and hepatic functional capacity. Thanks largely to the work of French and American investigators, we have at our disposal comparatively adequate methods of estimating renal efficiency. It is now generally recognized that two main types of renal functional defect exist; of these the one is characterized by inability on the part of the kidney to excrete substances for which a renal threshold exists, the other by inability to deal with the non-threshold substances. The typical threshold substance is sodium chloride; the typical non-threshold substances are urea and other nitrogenous waste products. Defective elimination of sodium chloride is the characteristic of

hydræmic or parenchymatous nephritis, while a failure to excrete urea and other waste nitrogenous products is typically seen in azotæmic or interstitial nephritis. Mixed types are, however, commonly met with, especially in connexion with acute forms of the disease. Any marked defect in the elimination of sodium chloride will lead to the retention of water, and the appearance of œdema: impaired excretion of urea may be detected by the urea concentration test (Maclean and de Wesselow [1]) and by estimations of the urea content of the blood. In addition, estimations of the total non-protein nitrogenous substances of the blood, of the diastatic index of the urine, and of the blood-pressure yield us further information as to the condition of the kidney.

In dealing with hepatic function on the other hand, we are in a very different position: it cannot be said that any simple or accurate method of detecting the presence or estimating the degree of hepatic failure is at present available. In default of such a test, a study has been made of the distribution of the urinary nitrogen (the time available limiting this to estimations of the urea, ammonia and total nitrogen), and also of the fibrinogen and lipase content of the plasma. The relationship of the urea nitrogen to the total non-protein nitrogen of the blood was also available to supplement the urinary findings.

Whipple and his collaborators [2] have observed that in dogs suffering from chloroform-necrosis of the liver, marked changes occur in the fibrinogen and lipase content of the plasma, a fall in the fibrinogen being accompanied by a great rise in the lipase. The results of the application of these observations to the study of hepatic function in the human being have not been striking. Whipple,[3] in eclamptics, has found that the plasma lipase is often considerably raised, and Rowntree, Marshall and Chesney [4] found an occasional increase in other types of liver lesions. In the same way a low plasma fibrinogen content has occasionally been found to be associated with damage to the liver. The fibrinogen is, however, of interest from another standpoint. As is well known, the fibrinogen of the plasma is definitely increased in amount in pregnancy, the other conditions in which an increase is seen being nephritis and the infections.[5] A rise in the fibrinogen may also be produced by parenteral introductions of protein into the organism, a fact of some interest as affording a possible explanation of the high fibrinogen content observed in pregnancy. In view of the diminution in this body which follows damage to the liver, a low fibrinogen content might be expected in the toxæmic cases. Dienst,[6] however, who has studied this point, found an increase in the fibrinogen in this group of cases as compared with normal pregnancies. In his opinion, the lesions found in the eclamptic are

due to intravascular clotting resulting from an abnormally high fibrinogen and fibrin-ferment content. The fibrinogen content of the plasma appeared, therefore, to be worth studying, both as a suggested causative factor in the disease, and as a possible index of liver damage.

In studies of liver function attention has frequently been directed to the nitrogenous metabolism. The rôle played by the liver in the urea synthesis has long been known, and more recently evidence has been adduced that this organ is an important site of the desamination of amino-acids. Damage to the liver parenchyma would, therefore, be expected to show itself in an increase of the urinary nitrogen appearing in the amino form, a fall in the urea, and a rise in the urinary ammonia. Attention was first called to changes in the nitrogen distribution of the urine in the toxæmias of pregnancy by the work of Stone, and the subject was subsequently more elaborately investigated by Wolf and Ewing.[7] The work of these latter authors, as far as it related to pernicious vomiting, has been adversely criticized by Underhill and Rand,[8] in view of the well-known studies of Folin[9] upon the effect of the nitrogenous intake upon the partition of the urinary nitrogen. Folin has shown that reduction of the nitrogen of the diet tends to reduce the fraction of the urinary nitrogen appearing as urea, while at the same time a rise usually occurs in the ammonia fraction. Thus, with a daily excretion of 14 to 18 grammes of nitrogen, 86 to 89 per cent. appeared as urea, and 3 to 5 per cent. as ammonia: with an excretion of 4.8 to 8 grammes the urea constituted 62 to 80 per cent. of the total nitrogen, and the ammonia 4.2 to 11.7 per cent. Folin, in his theory of protein metabolism, regards the urea nitrogen of the urine as, to a large extent at least, the product of exogenous protein metabolism, the nitrogen of the amino-acid products of digestion being split off and converted to urea, while the residue of the molecule is used either for storage as fat and carbo-hydrate, or for immediate energy production. The nitrogen partition of the urine is therefore dependent to a large extent on the amount of protein ingested. In addition the urea percentage is also affected by the amount of ammonia required for neutralization purposes, the ammonia nitrogen utilized in this manner being diverted from the metabolic path that ends in urea formation. Lastly, as Underhill and Rand point out, the nitrogen distribution in the urine of healthy persons is to some extent an individual peculiarity. It is evident, therefore, that extreme caution is necessary in drawing deductions as to liver function from the proportions of urinary nitrogen appearing as urea and ammonia. That extremely low urea values with raised ammonia ratios may occur in such diseases as acute yellow atrophy or phosphorus

poisoning, in which the liver parenchyma is almost entirely destroyed, is undoubted. Ewing and Wolf have recorded figures of 25.8 per cent. urea nitrogen, and 15.8 per cent. ammonia nitrogen, in the urine of acute yellow atrophy, and in a case of the same disease which I have recently had the opportunity of examining 26.3 per cent. only of the urinary nitrogen was present as urea, and 14.8 per cent. as ammonia. Such figures, however, though probably connected with the failure of the urea synthesis in the liver, are more than paralleled by those noted by Folin in a case of extreme inanition. In this patient 14.7 per cent. only of the urinary nitrogen appeared as urea, while the ammonia amounted to 40 per cent. The question is still further complicated by the possibility of the urea synthesis being affected in organs other than the liver. That such formation actually occurs has been shown by Folin and Denis,[10] and it is possible that the appreciable amounts of urea found in the urine during the last stages of acute yellow atrophy, with almost complete destruction of the liver tissue, have an extra hepatic origin.

The study of the desaminating function of the liver with a view to arriving at an estimate of the functional capacity of the organ has also been unsatisfactory. Van Slyke and Losee[11] could demonstrate no increase in the amino N content of the blood or urine in eclampsia, and Van Slyke and Stadie[12] state that except in acute yellow atrophy, increase in the amino N. content of the urine has not been found in hepatic disease. No determinations of the amino nitrogen were therefore made, since it did not seem probable that investigation of this point would add materially to any information that might be derived from the estimations of the urea and ammonia nitrogen.

Methods.

Blood. Urea, Van Slyke and Cullen's modification of Marshall's urease method. Non-protein nitrogen, Greenwald's method, using an ultimate concentration of 5 per cent. trichloracetic acid as the protein precipitant. Fibrinogen, Van Slyke's method (results expressed as mgrms. of nitrogen per 100 cc. of plasma). Plasma lipase, Lœvenhart's method.

Urine. Total nitrogen, Kjeldahl. Urea, by urease method. Ammonia by aeration.

Blood Pressure. Auditory method.

Urea Test. Concentration estimated for three consecutive hours after a dose of 15 grammes. The figures given represent the highest concentration of urea per cent. found in any one of these hourly specimens.

Normal Pregnancy.

The findings in 13 normal in-patients examined during the last eight weeks of pregnancy, and 34 out-patients are given in Table 1. The in-patients had been kept in bed and on a moderate protein diet (60—70 grammes protein per diem) for three days before the observations were made. Blood was drawn at 10.30 a.m., three hours after a light breakfast, and the urine was collected from 8 a.m. of the day on which the blood was taken to 8 a.m. of the following day. Precautions were taken to avoid loss and to prevent ammoniacal decomposition. In four of these in-patients a complete analysis was put through on a second occasion, after three days on an increased protein diet. The out-patients were drawn from an antenatal clinic, and were bled at 11 a.m. A specimen of urine for a rough examination was obtained at the same time. In all cases this was free from albumen and casts.

Certain abnormalities as compared with normal, non-pregnant individuals are at once apparent. Of these the most striking is the low blood urea. In the 17 observations on in-patients the blood urea ranged from 13.5 to 26 mgrms., with an average of 17.5 mgrms. per 100 cc. of blood. The 34 out-patients showed blood urea ranging from 10 to 19 mgrms., with an average of 14.2. The average for the 51 observations amount to 15.3 mgrms. urea per 100 cc. To obviate error the blood urea of ten non-pregnant female out-patients was estimated under similar conditions, and figures ranging from 20 to 26 mgrms. found. The method was also checked against solutions of urea of known concentration with satisfactory results.

The blood-urea of normal individuals has been investigated, among others, by Feigl,[13] Gettler and Baker,[14] and Addis and Watanabe.[15] Of these Feigl's figures are the most extensive. In 179 normal individuals between 20 and 40 years of age, 124 showed a blood-urea of 21 to 33 mgrms. per 100 cc., 23 more than 33 mgrms., and 17 only showed a lower content than 18 mgrms. Gettler and Baker, in 30 normal individuals, found the blood-urea above 21 mgrms. in every case. Addis and Watanabe, working on 29 normal individuals, who had for three days previously received a diet containing 76 grammes protein per diem, and taking the blood three hours after breakfast, found that in 23 cases the blood-urea ranged from 20 to 28 mgrms., while in only two cases was it below 20 mgrms. It is, therefore, exceptional to find a blood-urea below 20 mgrms. per 100 cc. in normal individuals, while, in the 51 specimens examined above, in three cases only did the blood-urea reach or exceed 20 mgrms.

Folin,[16] who has investigated the blood-urea content in 100 cases of pregnancy, gives figures closely corresponding to those found

by myself. On the other hand, Caldwell and Lyle,[29] in 150 cases, found an average blood-urea content of 22 to 26 mgrms. The figures given by these authors show a wide range for the blood-urea in normal pregnancy: at the lower end of the scale blood-urea contents, as low as 7 or 10 mgrms., occur, while at the upper end the values found reach as high as 46 mgrms. Losee, in a few primigravidæ, found from 17 to 33 mgrms. urea per 100 cc. of blood. No data are given by these authors as to the diet of their patients, and Folin's figures have not, as far as I am aware, been published in extenso.

The urea content of the blood in pregnancy is, therefore, still in dispute, but it is at least certain that abnormally low values are frequently present. What explanation can be given of the frequent occurrence of a low blood-urea in this condition? Urea is generally admitted to be a non-threshold substance, that is to say, a substance which is excreted by the kidney, however low its concentration in the blood. This being so, the urea content of the blood will depend upon three factors: 1. the amount produced, 2. the rate at which it is excreted, and 3. the total amount of body fluids. The last factor is of importance since urea is a readily diffusible substance and tends to distribute itself equally over the whole fluid content of the body. Folin, in explanation of the low blood-ureas found in his series, suggested that in pregnancy the kidney was abnormally sensitive to waste products, and that the blood-urea was kept at a low level owing to increased excretion. If this were so, we should expect to find abnormally high figures for the urea concentration test in normal pregnant women. The results obtained in the patients tested gave, however, no indication of such a state of hypersensitiveness, but corresponded to the concentrations given by normal healthy individuals. Furthermore, cases of toxæmia were seen (Cases 15, 19) in which, as judged by the urea concentration test, the concentrating power of the kidney was definitely subnormal, but in which the blood-urea still remained low. Such cases exclude the possibility of the low blood-urea content in pregnancy being attributable to increased sensitiveness to urea on the part of the kidney.

There appear, therefore, to be two possible explanations—a diminished production of urea, or an increased dilution of the urea when formed. We have but few data bearing on the latter possibility. Lloyd Jones's[17] observations on the diminished specific gravity of the blood in pregnancy suggest that a certain degree of dilution may be present, and in the amniotic fluid we have an addition to the fluid reserve of the body. That dilution may be a factor in reducing the urea content of the blood is indicated by the low blood-urea sometimes found in cases of pure parenchy-

matous nephritis, in which, with efficient excretion of urea by the kidney, failure of chloride elimination leads to very great dilution of the body fluids. In this condition we sometimes find blood-urea values below 20 mgrms. per 100 cc., but even in extreme cases of œdema the urea content of the blood remains considerably above that seen in cases of normal pregnancy. It seems probable, therefore, that diminished production is a more important factor in the causation of the low blood-ureas observed in pregnancy. Comparatively few studies are available on the effect of the nitrogenous intake upon the blood-urea content. Folin, Denis, and Seymour, working on chronic nephritis, were able to increase or diminish the blood-urea by increasing or diminishing the nitrogen of the diet. Addis and Watanabe have also investigated the effects of high and low protein diets on the urea content of the blood of normal individuals; with a daily urinary excretion of 5 to 7 grammes of urea the blood-urea was reduced to amounts as low as 12 to 15 mgrms. per 100 cc., while with 37 to 49 grammes of urinary-urea it rose to above 40 mgrms. The changes in the blood were produced rapidly, the maximum effect being found on the fourth or fifth day. It would appear, therefore, that the blood-urea content is directly dependent on the total nitrogenous metabolism, and that changes in the diet exercise a direct influence upon it. As Addis and Watanabe point out, close regulation of the blood-urea is unnecessary, since urea is comparatively non-toxic.

I know of no statistics of the average protein intake of the pregnant working class woman in this country. It is, however, well known that during pregnancy a very considerable amount of nitrogen is retained for the purpose of new tissue construction. In the case which was very elaborately worked out by Höfstrom [19] during the last 167 days of pregnancy, 310 grammes of nitrogen were retained, the urinary nitrogen for the same period averaging 10 grammes daily on a freely chosen diet, which contained about 80 grammes protein per diem. Other workers give similar figures for nitrogenous retention in pregnancy, the retention averaging about 2 grammes of nitrogen per diem. There is, therefore, a constant drain on the maternal protein ration for the purpose of building up new tissues, both maternal and fœtal.

In my own in-patient cases the urinary nitrogen, which may be taken as representing the maternal metabolism after the needs of tissue construction have been satisfied, amounted on the average to 8.3 grammes per diem, corresponding to a maternal metabolism of about 50 grammes of protein. Though this is a low protein ration, no complaint was made of the smallness of the diet. In the last four cases of the table, two observations were made,—the second of these representing the effect of three days' increased

protein diet. In the first case no rise occurred in the urinary-nitrogen, the additional protein having apparently been utilized for new tissue construction. In the last three cases a rise in both blood-urea and urinary-nitrogen is seen in the second observation. It was unfortunately impossible, owing to pressure on beds, to conduct a longer experiment in order to determine whether by prolonged heavy protein feeding a figure for the blood-urea approaching that given by some American observers, could be reached. If in the normal individuals investigated by Addis and Watanabe the blood-urea in the great majority of cases varied from 20 to 28 mgrms. per 100 cc. on a diet containing 12 grammes of nitrogen, a lower value would be expected in these cases of pregnancy, excreting on an average 8.3 grammes of nitrogen per diem. If this is the true cause of the low blood-urea content found in pregnancy, the out-patients whom I have examined must have been taking a considerably smaller amount of protein in their diet than were the in-patients. It is not improbable that the explanation of the different values found by different observers for the blood-urea content in pregnancy lies along these lines, the differences observed corresponding to different diets and, possibly, to different social strata.

The non-protein nitrogen of the blood in the normal in-patients averaged 26.4 mgrms., and ranged from 23 to 30 mgrms. These figures again correspond to those found by Folin, and are definitely lower than those given by Caldwell and Lyle. In spite of the low urea content the non-protein nitrogen remains at what may be regarded as a normal figure for non-pregnant individuals. An increase must, therefore, be present in some other nitrogenous constituent of the blood, to compensate for the diminished amount of non-protein nitrogen present as urea. The suggestion of Folin that this increase probably occurs in the amino N has not, however, been borne out by the work of Losce and Van Slyke, who found that in pregnant women the amino N of the blood was at a normal level. In consequence of the lowered content of the blood in urea, coupled with the normal non-protein nitrogen value, the ratio of urea N to total non-protein N is abnormally low, averaging 30 per cent., while the normal figure is in the neighbourhood of 50 per cent.

The lipase content of the plasma varied from .2 to .3 cc. (expressed as titratable acidity to N/10 NaOH), a normal figure. The fibrinogen showed the increase characteristic of pregnancy. In a few healthy non-pregnant women the fibrinogen nitrogen of the plasma was found to be in the neighbourhood of 40 mgrms. per 100 cc. (.25 per cent. fibrinogen). In the thirteen in-patients it ranged from 55 to 98 mgrms., and in 21 normal cases of pregnancy

from the antenatal clinic from 56 to 88 mgrms. The average fibrinogen nitrogen content in the 34 normal pregnancies examined amounted to 76 mgrms.—a very definite rise as compared with the non-pregnant individuals. No constant connexion was noted between the height of the plasma fibrinogens and the stage of pregnancy, though on the whole the figure was higher in the later than the earlier months.

The nitrogen partition in the urine is typical of that found in individuals on a moderately low nitrogenous diet. The percentage of total nitrogen appearing as urea is below 80 and in some instances falls as low as 71. The ammonia nitrogen is slightly on the high side.

The diastatic index of the urine is within normal limits—6.6–28. The efficiency of the kidney in concentrating urea, as judged by the urea concentration test, corresponds to that usually found in healthy young adults.

To control any cases of intra-partum eclampsia that might be seen a few patients were examined towards the end of labour. (Table 1.) As they present certain anomalous features, they will be briefly alluded to here. The most striking deviation from the normal is seen in the distribution of urinary nitrogen. The urea nitrogen tends to fall to an abnormally low level, in one case to 52 per cent. of the total nitrogen; at the same time an increase is usually found in the percentage of urinary nitrogen appearing as ammonia. This rise in the urinary nitrogen is probably, in part at least, to be attributed to a ketosis, since acetone is frequently present in the urine of parturient women towards the end of labour. If, as Harding suggests, the glycogen reserve is low in pregnancy, a period of semi-starvation, such as occurs in a prolonged labour, would naturally lead to the appearance of acetone bodies in the urine; it is possible also that the vigorous muscular exertion involved in labour leads to the formation of abnormal amounts of lactic acid. The low urea percentage is therefore partly to be explained by deviation of nitrogen to ammonia formation for neutralization purposes; it may also in part represent the result of an abnormally low nitrogenous metabolism, owing to diminished ingestion during actual labour, in an organism which has been for some time on a low protein diet. The variations observed in the nitrogen partition of the urine during the actual labour are readily understandable, and are of no great interest in themselves, but they serve to emphasize the comparative instability of the urinary nitrogen distribution in the pregnant woman, and the caution necessary in drawing conclusions from it.

The difficulty of the whole subject is well illustrated by the change of opinion which has taken place as to the value of the

ammonia co-efficient in the diagnosis of pernicious vomiting of pregnancy. Gilliatt and Kennaway,[20] in their discussion of this point, can only conclude that in cases of pernicious vomiting the rise in the percentage of urinary nitrogen appearing as ammonia seems to be too great and too sudden to be accounted for by the starvation alone, a position differing considerably from that originally taken up by Whitridge Williams, who believed that by the ammonia co-efficient we could definitely distinguish pernicious from hysterical vomiting.

The frequency of the presence of protein in the urine obtained by catheter towards the end of labour was also noticeable. Albuminuria, varying from a faint trace to a very definite cloud (to salicyl-sulphonic acid) was usually present, and is probably to be classed with the well-known albuminuria following muscular exertion rather than to be regarded as evidence of the presence of a toxæmia.

The chemical findings in normal pregnancy may seem to have been dealt with at undue length, but a study of the literature leads to the conclusion that the data available for normal pregnancy are scanty and contradictory. Especially few observations appear to be available on the nitrogen partition of the urine in normal pregnancy and labour. The impression left upon the mind by the findings detailed above is that we are dealing with an organism in a condition of low nitrogenous metabolism, and therefore from the standpoint of urinary-nitrogen distribution in unstable equilibrium. From the conditions present in pregnancy, it appears unlikely that an undue strain is being placed upon the excretory organs, but rather that the demands made upon the excretory functions of the kidney are, as far as concerns nitrogenous waste products, less than in the normal individual.

Albuminuric and Eclamptic cases.

The corresponding chemical data for toxæmic and eclamptic cases are given in the appended tables (2, 3, 4). The albuminuric cases are divided into slight and severe, not in any one finding, but on a general consideration of the results of each individual case.

Brief summaries of cases :—

1. No symptoms. Protein, a trace, a few epithelial casts. Later slight œdema. Delivered 10/5/21.

2. Occasional vomiting, slight œdema of legs. Protein, a trace. Delivered 18/3/21.

3. No symptoms. Protein, a fair amount, with a fair number of casts. Delivered 20/5/21.

4. No symptoms. Protein, a trace, scanty casts. Delivered 20/5/21.

5. Albuminuria first noted 19/9/21. Slight œdema. Protein, a considerable amount with fair number of casts. Old syphilitic scars legs and arms. Delivered 20/10/21. On discharge 30/10/21 protein and casts still present.

6. Œdema 14 days. Protein not present 26/8/21. Admitted in labour with moderate general œdema. First urinary specimen obtained early in labour. Protein, large amount, a few casts. Second specimen, two hours post partum. Protein, a large amount, numerous casts. Acetone trace. On discharge protein a trace, no casts.

7. Slight œdema 6 days. Protein, a considerable amount, with casts. Delivered 21/6/21. No protein on discharge.

8. Albuminuria first noted 28/9/21. Massive œdema of legs, slight elsewhere. Protein, a fair amount, casts scanty. No other symptoms. Delivered 26/10/21. Child died in labour—not macerated. Second specimen intra-partum—acetone, a trace, protein, large amount, casts a fair number. On discharge, protein a trace, no casts.

9. Fourteen days moderate œdema. Slight headache two days, with epigastric pain. Delivered 30/11/21 (at home).

10. Œdema one month. Moderate œdema on admission. disappearing in three days. Protein, a considerable amount, casts scanty. Delivered 30/3/21. Protein, a trace, no casts on discharge.

11. Œdema three weeks. Urine, protein, a fair amount, scanty casts. Blood and urine immediately before labour. Delivered 27/2/21. On discharge, protein fair amount, occasional casts.

12. Vomiting and headache for three months. No œdema. Protein, a trace, no casts. No fœtal movements felt for 14 days previous to admission. Delivered of a macerated fœtus 29/10/21. On discharge, protein, a trace. No casts.

13. In second pregnancy (four years previously) a slight œdema one week previous to delivery. Went to term. Albuminuria noted throughout present pregnancy, marked one month. Three weeks œdema legs and face. Vision misty right eye (no ophthalmoscopic changes) no vomiting or headaches. Protein, a large amount, casts, a fair number. Induced 30/11/21. $7\frac{1}{2}$ months living child. On discharge, protein, a fair amount, scanty casts. B. coli infection of urinary tract in puerperium.

14. Sickness throughout pregnancy, with headaches. Œdema two months; sight hazy one week (no retinitis). Fœtal heart audible. Urine protein large amount, casts fair number. Induced 8/10/21. Delivered 10/10/21. Fœtal heart inaudible 10/10/21. Dead fœtus 4 lbs., length 18 ins. Discharged 28/10/21. Protein

trace, a few casts. 15/12/21, protein trace, no casts. Diastatic 2. Urea concentration test 2.4 per cent.

15. In last pregnancy still-birth 7 months. Œdema last two pregnancies. Œdema first noted 18/3/21. Albuminuria found 21/3/21. Delivered macerated child 11/4/21. On discharge, protein, a trace, no casts.

16. Albuminuria detected 14/5/21. Slight generalized œdema since and severe headaches. Protein large amount, casts moderate numbers. Delivered 21/5/21. On discharge, protein a trace, casts fair numbers.

17. Occasional vomiting throughout pregnancy. Six weeks' œdema, which had, on admission, almost completely subsided. Protein, a considerable amount. Casts fair number. No fœtal movements felt for eight days. B.P. fell steadily from 185 mm. Hg. (9/5/21) to 150 (16/5/21), when patient was delivered of a macerated fœtus. On discharge, protein, a trace, occasional casts. 25/12/21, no protein, no casts.

18. Six years previously generalized œdema attributed to nephritis; three weeks swelling of feet, one week headache. On admission, moderate œdema. Protein large amount, with numerous casts. Delivered 27/6/21.

19. Œdema six weeks; cough and vomiting one month. Very marked œdema on admission. Delivered 15/3/21 (child living, 9 lbs. 5 oz.; died three days later from congenital heart). Second analysis of blood and urine immediately pp. On discharge, protein, a trace, casts fairly numerous.

20. Œdema one month. Admitted for accidental hæmorrhage. Blood taken immediately before dilatation and delivery; urinary specimen at same time. Protein, a large amount, and fair number of casts. On discharge, protein, a fair amount, numerous casts.

21. Fourteen days slight œdema. No other symptoms. Albumen found 11/3/21. Blood immediately after delivery of placenta; urine six hours p.p. Protein, a very large amount, casts numerous. Urine on discharge showed fair amount of protein.

22. Eclampsia in preceding pregnancy. Admitted for albuminuria and slight œdema in 7th month. Eclamptic fits 5/2/21. Cæsarean section, living child. On discharge, urine protein considerable amount, a few casts. 16/3/21, urine, protein fair amount.

23. Some weeks œdema and headaches. Fits started 3 a.m. 10/8/21, very severe. Cæsarean section 11 a.m. (child dead). Specimens of urine before and after Cæsarean section. Bled at 3 p.m. while in 18th fit. Fits ceased 4 p.m. Urine, protein, a very large amount, numerous casts. On discharge, protein, a faint trace, occasional casts.

24. All previous pregnancies normal. Swelling of legs

throughout this pregnancy and generalized œdema one month. Delivered 6/11/21. Bled 10 a.m. 7/11/21; urinary specimen 4 a.m. 7/11/21. Considerable amount of protein, numerous casts. Fit at noon 8/11/21, and at 2 p.m. 9/11/21. Bled between these fits; specimen of urine at 6 p.m. same day. On discharge, 7/12/21, protein a trace, casts scanty.

25. Two months œdema of ankles. Admitted 4/9/21 in labour. Two fits during labour. First urinary specimen by catheter after first fit. Protein, a considerable amount, no casts. Delivered by forceps. Bled and second urinary specimen on the following day. On discharge, protein, a small amount, scanty casts.

26. Admitted 29/3/21, with a history of some weeks' œdema, and two fits on 27/3/21. Fœtal heart sounds not heard. Slight œdema. Recent retinitis. Urine protein very large amount, very numerous casts. 30/3/21, B.P. 182. 31/3/21, fits recurred. Cæsarean section. Fœtus macerated. On discharge, protein small amount, casts scanty. Retinitis clearing.

27. Albuminuria noted 29/2/21. Œdema noted four days. Admitted 13/3/21, after seven fits. Cæsarean section 13/3/21. Urine, specimen represents 22 hours post-operative excretion. Protein, a very large amount, numerous casts. At discharge protein, a faint trace, no casts.

In discussing these data certain problems present themselves. In the first place, are we dealing with a functional defect in the kidney in any way peculiar to pregnancy, or is the renal lesion in pregnancy from a functional standpoint paralleled by other types of nephritis? Secondly, can we, by functional tests, differentiate long-standing nephritis complicated by pregnancy from renal damage arising in the course of pregnancy? Thirdly, what evidence is available as to the presence of hepatic damage, and have we at present any grounds for distinguishing a predominantly hepatic type of disease? Lastly, what bearing has the chemical examination on prognosis and treatment?

The Renal Lesion.

That chloride retention is present in the majority of these cases is evidenced by the presence of œdema. With a few exceptions among the milder cases, generalized œdema, often of a marked character, was present in all the patients observed, and may be accepted as evidence of defective chloride elimination. The renal lesion presents, therefore, on the one side the characteristic of the parenchymatous, or hydræmic type of nephritis, and the question arises whether we are dealing with a pure parenchymatous type of nephritis, or whether the lesion is of the mixed type, involving

failure to excrete the nitrogenous waste products as well as the chlorides.

The frequent absence of an increase in the non-protein nitrogen and urea of the blood has been cited by some authors as a distinctive feature of the toxæmias of pregnancy, and has been regarded as a diagnostic point between the true toxæmias and cases of chronic nephritis complicated by pregnancy. It must, however, be recognized that nitrogenous retention is not a necessary result of renal functional failure of the azotæmic type nor when present is it an exact measure of the degree of impairment of function present. The actual figures attained by the urea and other nitrogenous waste products of the blood is the product of three factors—the total nitrogenous metabolism on the one side, and the gravity and duration of the renal lesion on the other. The work of Folin and his collaborators, quoted above, has demonstrated the connexion between the nitrogenous intake in cases of chronic interstitial nephritis and the height attained by the non-protein nitrogen of the blood. It is also obvious that the duration of the lesion is of importance; since the accumulation of nitrogenous waste products must be a gradual process. It is only the excess of these products formed over the amount that can be excreted per diem that accumulates, and time must therefore elapse before a really high figure can be attained, even in severe cases. Of the actual excess non-protein nitrogen that accumulates by far the largest portion is urea. Thus, in a recent paper by Höst and Hatlehot [22] the figures given show that when the total non-protein nitrogen of the blood amounts to 200 or 300 mgrms., between 80 and 90 per cent. is present as urea, as compared with a normal percentage of about 50. Lastly, in moderate degrees of azotæmic nephritis, no accumulation of non-protein nitrogen occurs in the blood, since the normal functional capacity of the kidney is very considerably in excess of any demands that are usually made upon it. Moderate degrees of damage therefore will not make themselves apparent by increase in the non-protein nitrogen of the blood, but can be detected only by other methods of examination. Of such methods two are available—the Ambard coefficient and its variants, and the urea concentration test. It is not necessary to discuss the relative value of these two tests here, but in the accompanying reference [1] the subject is fully considerd and reasons are given for preferring the simpler concentration test.

If we apply the above considerations to renal inadequacy in pregnancy, it is obvious that in the pregnant woman the conditions present will militate against large accumulations of non-protein-nitrogen in the blood, even when the renal defect is of considerable severity. In the first place, the main constituent of the non-protein-

nitrogen accumulations seen in cases of severe nephritis, that is, urea, is in normal cases of pregnancy at a remarkably low level, owing, as was suggested above, to a comparatively low maternal nitrogenous metabolism; secondly, the renal lesion, unless a pre-existing nephritis is present, is usualy of comparatively short duration; thirdly, in the majority of cases the damage, as judged by the urea concentration test, is only of moderate severity. In estimating the progress and severity of the defect in nitrogenous excretion in pregnancy the blood-urea is therefore a comparatively poor criterion, and the most reliable test appears to be the response evoked to the strain put upon this function by the administration of a dose of urea.

In the cases tabulated above it will be noticed that while the average urea content of the blood exceeds that normally found in pregnancy (averaging in group i 21 mgrms. per 100 cc., in group ii 38 mgrms., and in group iii 44 mgrms.), the excess is not marked; and in some instances indeed the blood-urea remains below 20 mgrms. In only three instances were very definitely increased figures for the blood-urea obtained. In the first of these œdema had been present for more than two months, other symptoms for eight months. No urea test was attempted, but since the urea content of the blood was equivalent to that usually found after the administration of 15 grammes or urea, the urinary urea percentage may be taken as an index of the concentrating power of the kidney. This amounted to only 1 per cent., so that the renal lesion was undoubtedly of a very severe character. In the other two cases eclamptic fits occurred. The first of these (Case 23) had shown œdema for "some weeks," the blood-urea stood at 63 mgrms., and the urea concentration in the urine amounted to only .4 per cent. In the second, œdema had been present during the major part of the pregancy, and with a blood-urea of 50 mgrms. the urea concentration in the urine amounted to .9 per cent. only. Even in such cases, in which the lesion is of a severe nature, the accumulation of nitrogenous waste products is not comparable with that frequently seen in non-pregnant individuals suffering from chronic nephritis, in whom, to judge by the concentrating power, the renal lesion is of a corresponding grade of severity. This comparatively small accumulation of the nitrogenous waste products in the blood is noted by Caldwell and Lyle in their paper, and is well shown in Case 13 of my own series. In this case a previous pregnancy had been complicated by eclampsia, and when the patient was first seen in the 6th month of her second pregnancy, albuminuria, probably the result of the first toxæmia, was already present. In spite of a steady fall in the concentrating power of the kidney for urea, the blood-urea showed a comparatively slight rise, and on

the day following the eclamptic fits had only reached 38 mgrms. per 100 cc.—a figure within the normal limits for non-pregnant individuals. If we contrast the blood-urea findings with the results obtained by the urea concentration test, there would appear to be little doubt that the latter method of examination is the more valuable in renal lesions occurring in pregnancy. With the exception of a few cases in the milder group, a definite fall in the concentrating power of the kidney as compared with that found in normal pregnancy was almost invariably present. The most obvious exception to this statement is presented by Case 17. In this case, however, the fœtal movements had been absent for eight days previous to examination, no fœtal heart sounds were audible on admission to the ward, and the blood pressure, which, when first seen, was 185 mm. Hg., fell in the course of a week to 150. Seven days after admission the patient was delivered of a macerated fœtus, and she appears, when first examined, to have been undergoing a spontaneous cure as the result of fœtal death. In the other patient (Case 8), though gross generalized œdema and high-grade albuminuria were present, the urea concentrating power of the kidney was good, and the blood pressure at a normal level. This case appears to have been an instance of pure parenchymatous nephritis occurring in pregnancy. The child was delivered dead owing to mechanical difficulties in labour, but at no time did the mother's general condition give any cause for anxiety.

It may here be remarked that in four cases of pyelitis complicating pregnancy which were examined from the standpoint of renal function, the blood-ureas varied from 14 to 21 mgrms. Evidence of a renal defect was, however, present in all in the form of a definitely lowered response to the urea concentration test, the lowest figure noted being 1.3 per cent.

It would seem, then, that the indications furnished by the urea concentration test are, in these cases, of considerably greater value than determinations of the urea and non-protein-nitrogen of the blood. Further, the repetition of the test, when it has been possible, has usually given indications of the progress of the case. As is evident from the tables, the degree of depression of the concentrating power corresponds with other indications, both chemical and clinical, of the severity of the disease. With few exceptions, defect of the urea excreting power of the kidney appears to be the rule in cases of the toxæmias of pregnancy, and since œdema is almost invariably present, the nephritis, with which we are dealing, would appear to be of the mixed type; the impairment of the ability to excrete waste nitrogenous products, though definite, as shown by the urea test, is not usually extreme. For the reasons suggested above marked accumulation of urea and other non-

protein nitrogenous bodies in the blood are infrequent, but from a functional standpoint the lesion does not appear to differ in any way from the mixed type of nephritis, so frequently seen in non-pregnant individuals. Owing to the conditions of nitrogenous metabolism obtaining in pregnancy, and to the fact that in the majority of cases the duration of the disease is brief, the renal defect is more readily detected by subjecting the organ to a strain, as in the urea concentration test, than by estimating the non-protein-nitrogen content of the blood.

The diastatic value of the urine has, in the majority of cases, been found to lie within normal limits. If we accept the range of the diastatic index in health as extending from 6.6 to 28, in two cases only (14, 22) were definitely lowered diastatic indices present previous to delivery. In the best marked of these the renal lesion was undoubtedly of considerable standing, symptoms having persisted throughout pregnancy, and marked nitrogenous retention being present. In the other (22) the previous pregnancy had terminated in eclampsia. In both these cases, therefore, there was reason to suspect that a chronic type of disease was present. In acute and parenchymatous nephritis the diastatic content of the urine is not usually diminished; low diastatic values are typically associated with long-standing nephritis of the azotæmic or interstitial type, and would not, therefore, be expected in the acute renal lesions of pregnancy. There appears, however, to be a tendency for a fall in the urinary diastase to occur in these cases after delivery, and it is possible that this fall may be, in some cases, an indication of the onset of a chronic change in the kidney. An abnormally high diastatic index was seen in one case only—in a specimen obtained during severe eclamptic fits. The occurrence of a high diastatic index in the urine of eclamptics was first noted by Corbett, and has recently been investigated by Mackenzie Wallis. The latter author regards the high diastatic content as distinguishing true toxœmias of pregnancy from cases of nephritis occurring in pregnancy, and states that, contrary to what is observed in pancreatic lesions, increase in the urinary diastase in pregnancy is not associated with a raised diastatic content of the blood. He attributes the rise in the urine to the abnormally permeable condition of the renal glomerulus. In the case of my own series, an eclamptic, in which a high diastatic index occurred, the nitrogenous partition of the same sample of urine in which the diastase was estimated, was that which is usually regarded as typical of hepatic failure. It is a curious fact that in a specimen obtained from a case of acute yellow atrophy of the liver, in which the same type of nitrogenous distribution was found, the diastase was also high (100 units). The work of Davis and Ross,[25] however, suggests

that there is no connexion between increase in the diastatic content of the urine and liver lesions. They found that the usual rise in the urinary diastase which follows chloroform anæsthesia, did not occur after excision of the pancreas, and consequently could not be attributed to the liver lesion produced by the chloroform. The association between the common bile duct and the pancreatic duct suggests the possibility, however, that the effect of liver injury may be indirect, and that some alteration of the consistence of the bile may lead to obstruction to the pancreatic outflow. In any case a rise in the urinary diastase is not, in my small experience, a valuable diagnostic sign in the toxæmias, and, as is shown by Cases 22 and 24, is not a necessary precursor of convulsions.

An extensive literature on the blood pressure in the toxæmias of pregnancy already exists, and the significance of the blood-pressure need not be discussed here. The lack of connexion between the accumulation of waste nitrogenous products in the blood and the rise in blood pressure is, however, well illustrated by this class of case; thus in Case 19, with 31mgrms. of non-protein-nitrogen in the blood, we find a blood pressure of 180 mm. Hg., while in Case 14, where the non-protein-nitrogen reaches the high figure of 72 mgrms., the blood pressure stands at 174 mm. Hg. A much closer correspondence is, however, apparent between the height of the blood-pressure and the diminution in the power of urea concentration, and the blood-pressure would thus appear to be a most valuable indication of the degree of impairment of this function of the kidney. The rapid fall in blood-pressure which occurs in most of these cases after delivery, frequently coincides with an equally rapid improvement in the findings by the urea concentration test. Roughly speaking, blood-pressure and power of urea concentration shown an inverse relationship in these cases.

The Liver Function.

The lipase content of the plasma proved of singularly little interest. Since the original work of Whipple on the increased lipase content of eclamptic plasma, no observations on this point appear to have been published, a fact which suggests that from a clinical standpoint the test has proved of little value. In my own cases, with the exception of one eclamptic (Case 27), in whom a slightly raised lipase content was found, no deviations from the normal were noted. American observers, who have utilized this test in attempts to detect the presence of functional defects of the liver in other types of hepatic disease, appear to have obtained equally unsatisfactory results.

The fibrinogen estimations, expressed in terms of milligrammes of nitrogen per 100 cc. of plasma, to some extent bear out the

statement of Dienst that a rise in the fibrinogen content of the plasma is a feature of the toxæmia of pregnancy. Averaging the results, and taking the highest figure noted in each individual case, we find that in the mild cases the average fibrinogen nitrogen content amounted to 87 mgrms per 100 cc., while in the severe cases and eclamptics a figure of 101 mgrms. per 100 cc. is obtained. In 34 normal cases of pregnancy the fibrinogen averaged 76 mgrms. Before we can estimate the value of the fibrinogen content as a guide in determining the severity of a case, certain difficulties have, however, to be considered. In the first place, in cases in which œdema is present, a rise in the fibrinogen content may be masked by blood dilution; thus, in Case 15, subsidence of œdema, previous to delivery of a macerated fœtus, was accompanied by a rise in the fibrinogen nitrogen of the plasma, amounting to 16 mgrms. The second and more serious difficulty lies in the great rise in the plasma fibrinogen which accompanies infections. In three cases of Bacillus coli pyelitis complicating pregnancy in which determinations of the fibrinogen were made, figures of 175 mgrms., 144 mgrms. and 126 mgrms. of fibrinogen nitrogen were found; in another case, of syphilitic infection in pregnancy, the fibrinogen amounted to 136 mgrms. of nitrogen per 100 cc. of plasma. The difficulty of excluding the presence of such infections is obvious, and must to some extent invalidate deductions drawn from the fibrinogen percentage in the toxæmias of pregnancy. Taking the cases as a whole, however, there seems to be no doubt that a rise in the plasma fibrinogen accompanies the severer types of lesion. The reason for this rise is obscure. An increased content of fibrinogen is found in the plasma of cases of nephritis, and it is possible that the rise seen in toxæmic cases is of the same nature. Gram,[26] who has published several papers upon the fibrin content of the blood, and its variations, and who has recently embodied his original work in a monograph upon this subject, believes that the rise in fibrinogen which is constantly present in pregnancy is the result of slight irritation of the liver. If this theory is correct, it is possible that the rise above the normal figure for pregnancy, which is observed in many toxæmic cases, is hepatic in origin. In this case the excessive production of fibrinogen would be attributable to a toxin sufficiently powerful to irritate the liver, but not to inhibit the formation of fibrinogen. In no case was an actual deficiency of fibrinogen observed, indicating paralysis of this function of the liver. Such deficiency has been found comparatively infrequently in lesions involving destruction of the liver parenchyma, and has not, as far as I am aware, been demonstrated in the toxæmias of pregnancy. Greatly increased velocity of red cell sedimentation, associated with auto-agglutination, was

frequently observed in the oxalated bloods, in which a raised fibrinogen content was present.

With the exception of two instances no change in the nitrogen distribution of the urine was noted, which could not be paralleled in the normal cases of pregnancy and labour. In the first of these, an eclamptic (Case 23), specimens of the urine obtained during the fits, and both before and after Cæsarean section, showed an altogether abnormal nitrogen partition. The urea nitrogen accounted for only 32 to 35 per cent., the ammonia nitrogen for 14 to 20 per cent. of the nitrogen present, the two bodies together amounting to 50 per cent. only of the urinary nitrogen. No acetone bodies were present. On the following day a normal ratio had been re-established, to be followed on the third day by a slight rise in the ammonia percentage, and the appearance of considerable amounts of acetone, due probably to inanition. The other case, an albuminuric, seen first when in labour, showed an almost exactly similar distribution in a specimen obtained at the conclusion of labour. Traces of acetone were, however, present. Apart from the urinary nitrogen partition no indications of a severe lesion were present, no fits occurred, and the patient's general condition did not give rise to any anxiety. In a specimen obtained six hours previously during labour the nitrogen distribution had been normal. A most striking characteristic of these anomalous nitrogen partitions was the suddenness of their appearance and disappearance. In the one case, a specimen obtained six hours previous to that in which the abnormal distribution was found, showed a perfectly normal nitrogen partition. In the other a return to a normal distribution occurred in twenty-four hours. These abrupt transitions were noticed also by Ewing and Wolf. Thus in one case of eclampsia described by these authors, in which 42 per cent. of the urinary nitrogen was present as urea, and 18.3 per cent. as ammonia, a specimen obtained twelve hours later showed no less than 78.9 per cent. of the nitrogen as urea, and only 8 per cent. as ammonia. The figure to which the urea N percentage may fall in connexion with lesions of the liver is illustrated in their paper by a fatal case of eclampsia in which the urea N amounted to 35.8 per cent., and the ammonia to 6.1 per cent., and in which, post mortem, marked liver autolysis was found; and by a case of acute yellow atrophy in the sixth month of pregnancy, in which the urea N fell to 25.8 per cent., with 15.8 per cent. ammonia. What is probably the lowest urea percentage in the literature was noted by Morner [27] in a case of phosphorus poisoning. In this remarkable case only 4.4 per cent. of the urinary nitrogen was present as urea, and 26.7 per cent. as ammonia. The figures noted above in two cases of my series are therefore of the nature of those seen in

association with advanced destructive lesions of the liver. It is difficult to believe, however, that a degree of liver damage, which, to judge from its effects on the nitrogenous metabolism would correspond to that seen in the profound hepatic disorganization of acute yellow atrophy, can have been present in these cases. A very cogent objection to this view appears to lie in the sudden appearance and disappearance of the phenomenon, and in the recovery of the two patients. The comparative instability of the urinary nitrogen partition in pregnancy has already been noted in connexion with the findings in the urine obtained from women in labour, and the necessity for caution in interpreting the results of the urinary analysis suggested; in any case the transitory nature of the changes seen militates against the use of this method of examination as a guide in prognosis and treatment.

In a recent paper Killian and Sherwin [28] have attempted to divide the toxæmias of pregnancy into nephritic and hepatic types on the basis of the ratio of the urea nitrogen to the total non-protein-nitrogen of the blood. In a group of cases which they regarded as nephritic toxæmias the urea nitrogen constituted 50 to 67 per cent. of the total non-protein nitrogen of the blood, while in cases classified as true eclampsias or hepatic toxæmias 16 to 38 per cent. only of the total non-protein-nitrogen was present as urea. The general consensus of opinion appears to be against this view. Caldwell and Lyle,[29] in a paper appearing simultaneously with that of Killian and Sherwin, arrive at a diametrically opposite conclusion. They comment on the extreme variability of this ratio in normal cases, the variation noted being from 12 to 59 per cent.; they also point out that in a case in which post mortem the typical liver lesions of eclampsia were found, the ratio of urea N to total non-protein N was the highest found in their series—76 per cent. Slemons [30] had previously found that the ratio was of no value, and a similar conclusion may be drawn from the figures given by Losee and van Slyke.[11] In my own cases there was no indication of any possibility of differentiation into types along these lines. In consonance with the usual finding in nephritic cases any rise in the total non-protein-nitrogen of the blood was accompanied by a rise in the proportion of total nitrogen, appearing as urea. When a renal co-exists with an hepatic lesion the tendency of the former will be to raise the blood-urea ratio, while the latter will presumably tend to lower the urea ratio; in pure hepatic lesions the ratio might therefore be of value, but the co-existence of a renal lesion will render its interpretation difficult. It is noticeable that in the two cases discussed above, in which a marked anomaly of the urinary nitrogen distribution was noted, the blood specimens obtained at the same time showed no corresponding deviation from the normal.

To sum up, there appears to be no definite evidence that we

can detect the presence of a liver lesion in these cases, a conclusion which was only to be expected in view of the uncertainty of our methods of estimating hepatic failure. In the limited number of cases available for study no evidence could be obtained by the methods employed of a differentiation into groups, nor from a chemical standpoint were any definite differences detected between those cases complicated by convulsions and those in which no convulsions occurred. On the contrary, the cases studied appeared to present a continuous gradation from the mildest type of albuminuria of pregnancy to the most severe. No evidence could be obtained of the existence of an hepatic as distinct from a nephritic toxæmia of pregnancy.

This being so, what assistance can the chemical examination of the case afford to the clinician when confronted with the question whether, in the interests of the mother, the pregnancy should be terminated or allowed to continue? That termination of the pregnancy leads, in the majority of patients, to a rapid clinical improvement is undoubted; in my own cases the functional tests provide striking evidence of the rapidity of improvement after delivery. In the majority of cases blood-pressure, diastatic index, power of urea concentration, and nitrogenous waste products in the blood have returned to a normal level on discharge. A similar functional improvement occurs with intra-uterine death of the fœtus. Caldwell and Lyle arrive at a similar conclusion, and in an examination of 24 eclamptic cases thirty months after delivery found only two instances of definite nephritis. A striking capacity for improvement is therefore shown by the kidney of pregnancy. On the other hand, the course of events in some of my own cases suggests that if the lesion is allowed to progress, and the pregnancy allowed to continue its course, permanent damage to the renal function may result.

As far as I am able to judge from the limited material available, chemical examination should, in the future, be of definite value in averting the risk of permanent damage to the mother, and in indicating the stage at which induction becomes necessary. A definitely raised urea content of the blood, that is to say, under the conditions obtaining in pregnancy, a blood urea above 40 mgrms. per 100 cc. is proof that the kidney is severely damaged, and is an indication for induction. In default of a raised blood urea, the urea concentration test affords valuable evidence of the condition of the renal function, and, when the figure obtained is below 2 per cent., termination of the pregnancy should be considered. Repetition of both examinations, after an interval, is invaluable, since a rising blood-urea with a falling concentration capacity constitute an obvious indication of a progressive lesion. In cases in which a low diastatic is present, chronic disease and a

less complete recovery are suggested. In all cases blood pressure observations afford most valuable assistance in prognosis and treatment.

In default of methods of estimating hepatic function we are reduced to a study of the renal efficiency of these cases. It appears probable, however, if one may draw conclusions from a relatively small material, that by estimations of the renal efficiency along the lines suggested above, we may be able to arrive at definite criteria for interrupting the pregnancy, and thereby favourably influence both the immediate and ultimate results of the toxæmias of pregnancy.

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Normal Pregnancies.

TABLE I.

		Blood.		Plasma		Urine.						
		(*mgms. per 100 cc.*)		(*mgms. per 100 cc.*)		*Total N.*			*Unde-*			
Age.	*Preg-nancy.*	*Urea.*	*Non-protein nitrogen.*	*Fibrino-gen N.*	*Lipase. cc. N NaOH / 10*	*grammes per diem.*	*Per cent. as urea.*	*Per cent. as NH_3.*	*termined N per cent.*	*Diastatic Index.*	*Urea Test.*	*B.P. (systolic).*
25	1st	19	27	82	.26	11.36	76.8	6.3	16.9	20	3.2	126
22	1st	17.5	25	69	.30	3.70	76.2	5.2	18.6	10	4.1	105
35	8th	15.5	24	72	.31	8.43	71.1	5.2	23.7	22	3.9	133
42	12th	16.0	26	93	.27	5.4	74.8	4.8	20.4	10	3.2	117
41	11th	20.0	27	66	.24	6.81	75.4	4.7	20.1	28	3.9	125
24	1st	18.0	27	78	.27	9.89	78.9	4.3	16.8	10	3.2	112
25	1st	17.0	26	96	.22	9.44	78.5	5.0	16.5	6.6	3.4	118
20	1st	26.0	30	71	.28	9.4	79.3	3.8	16.9	22	3.9	125
36	4th	20.0	28	72	.30	11.91	72.8	6.7	20.5	20	4.5	122
21	1st	17.5	27	79	.25	8.25	77.9	4.8	17.3	10	2.85	142
		17.0	28	67	.27	5.81	77.6	3.6	18.8	10	—	—
35	2nd	14.0	23	85	.22	4.37	74.0	3.4	22.6	20	3.25	129
		17.0	26	84	.24	8.60	75.9	5.0	19.1	20	—	—
26	4th	15.0	24	66	.24	7.79	75.4	5.1	19.5	6.6	3.35	120
		18.5	27	70	.22	14.67	79.3	5.2	15.5	10	—	—
29	6th	13.5	26	58	.24	4.85	78.9	6.5	14.6	10	3.0	120
		15.5	27	55	.23	11.11	77.7	6.5	15.7	10	—	—
Cases in Labour :—												
		18.5	26	88	.25	—	52.3	11.2	36.5	10	—	—
		16.0	27	86	.31	—	64.0	3.2	32.8	25	—	—
		20.0	25	81	.29	—	76.0	5.5	19.5	10	—	—
		23.0	25	63	.24	—	65.0	9.8	25.2	28	—	—
		18.5	28	101	.28	—	65.9	9.2	24.9	28	—	—
		12.5	24	131	.30	—	62.5	10.7	26.8	10	—	—
		13.0	22	131	.25	—	73.6	9.0	17.4	10	—	—

TABLE II.

				Blood. (mgms. per 100 cc.)		Plasma.		Urine.						
No.	*Age.*	*Preg. nancy.*	*Date.*	*Urea.*	*Non-protein Nitrogen.*	*Fibrinogen N. mgms. per 100 cc.*	*Lipase. cc. N/10 NaOH*	*Total N.*	*Per cent. as urea.*	*Per cent. as NH_3.*	*Undetermined N per cent.*	*Diastatic Index.*	*Urea Test.*	*B.P. (systolic).*
1.	41	9th	16/2/21	16	23	77	.26	5.43	78.6	6	15.4	5	4.4	164
2.	32	2nd	10/3/21	27	30	93	.31	6.38	76.2	4	19.8	28	3.5	135
3.	21	2nd	25/4/21	13	22.5	97	.26	7.26	74.9	5.9	19.3	10	3.2	128
4.	20	1st	10/5/21	21	27	106	.33	7.18	77.9	4.8	17.3	10	2.6	133
5.	20	1st	23/9/21	23.5	—	—	—	9.03	78.2	5.7	16.2	10	2.7	132
			29/10/21	—	—	—	—	—	—	—	—	20	2.7	134
6.	24	1st	15/9/21	22.5	23	60	—	—	72	6.6	21.4	10	—	145
			15/9/21	—	—	—	—	—	33.8	12.4	53.8	—	—	—
			23/9/21	—	—	—	—	—	—	—	—	28	2.6	142
7.	21	1st	3/6/21	19.5	—	—	.26	—	74.2	7.1	18.7	—	—	146
			10/6/21	20	28	78	.29	—	—	—	—	20	2.85	142
8.	29	1st	30/9/21	11.5	—	—	—	—	—	—	—	10	4.0	124
			22/10/21	13	25	81	—	6.4	67.2	8.3	24.5	20	—	130
			23/10/21	—	—	—	—	—	48.2	18.7	33.0	10	—	—
			3/11/21	19	27	92	—	—	—	—	—	6.6	2.45	120
			15/12/21	—	—	—	—	—	—	—	—	5	2.44	128
9.	30	1st	26/11/21	20.5	28.6	81	—	8.26	78.0	5.0	17.0	10	1.74	133
10.	28	1st	21/3/21	26	27	91	.30	7.38	81.6	3.4	15.0	10	2.0	138
			7/4/21	21.5	—	—	—	—	—	—	—	10	3.7	124
11.	41	1st	27/2/21	30.0	35.7	98	.32	5.39	81.8	4.1	14.1	10	—	140
			12/3/21	—	—	—	—	—	—	—	—	8	2.5	131
12.	28	3rd	28/10/21	20.5	26.5	88	—	13.1	62.8	2.4	34.8	6.6	—	108
			5/11/21	—	—	—	—	—	—	—	—	2.8	3.07	108

Severe Albuminuria.

TABLE III.

				Blood. (mgms. per 100 cc.)		Plasma.		Urine.						
No.	*Age.*	*Preg. nancy.*	*Date.*	*Urea.*	*Non-protein Nitrogen.*	*Fibrinogen N. mgms. per 100 cc.*	*Lipase. cc. N/10 NaOH*	*Total N.*	*Per cent. as urea.*	*Per cent. as NH_3.*	*Undetermined N per cent.*	*Diastatic Index.*	*Urea Test.*	*B.P. (systolic).*
13.	34	3rd	25/11/21	37	38.5	120	.30	—	73.8	8.6	20.4	10	2.1	197
			29/11/21	33	37	102	—	—	78.7	5.9	14.6	10	1.8	212
								—	76.2	4.7	19.1	6.6	—	—
				23	28	114	—	—	—	—	—	10	1.4	152
								—	—	—	—	—	1.8	150
14.	27	1st	4/10/21	91	72	83	.34	11.88	86.5	2.7	10.8	2	(.9)	174
			10/10/21	—	—	—	—	—	84.9	2.4	12.3	2.5	—	—
								—	84.2	2.3	13.5	2	—	—
			13/10/21	41.5	40	78	—	—	—	—	—	2	1.6	154
			27/10/21	23	26	62	—	—	—	—	—	2	2.6	128
			15/12/21	—	—	—	—	—	—	—	—	2	2.4	118
15.	27	6th	29/3/21	19.5	27.5	84	.28	2.08	68.2	9.2	22.6	10	1.8	144
			6/4/21	15	24	100	.27	7.41	76.3	8.7	15.0	10	—	136
			20/4/21	—	—	—	—	—	—	—	—	20	4.	—
16.	24	1st	19/5/21	26	34	103	.32	8.85	82.4	4	13.6	28	2.2	192
			2/6/21	—	—	—	—	—	—	—	—	6.6	3.9	135
17.	23	1st	9/5/21	26.5	33	140	—	5.88	73.4	5.1	21.5	10	3.3	185
			25/5/21	—	—	—	—	—	—	—	—	4	3.3	127
			25/11/21	—	—	—	—	—	—	—	—	4	3.1	118
18.	24	1st	21/6/21	37	40	119	.29	6.92	75.4	9.4	16.2	10	1.9	162
19.	34	2nd	11/7/21	18	31	106	—	5.73	77.4	2.4	20.2	10	1.6	180
			15/3/21	31	33	92	.27	—	80.6	3.6	15.8	10	—	—
			23/3/21	27.5	—	86	.29	—	—	—	—	4	2.0	142
20.	27	1st	26/9/21	41.5	—	56	.29	—	62.5	6.2	31.3	10	—	170
			29/9/21	—	—	—	—	—	—	—	—	5	2.8	134
21.	24	1st	17/3/21	35	33.4	103	.35	—	64.4	8.2	27.4	10	—	180
			23/3/21	24	—	113	.29	—	—	—	—	5	2.7	140

Eclamptics.

TABLE IV.

Eclamptics.

TABLE IV.

No.	Age.	Preg. nancy.	Date.	Blood. (mgms. per 100 cc.) Urea.	Blood. (mgms. per 100 cc.) Non-protein Nitrogen.	Plasma. Fibrinogen N. mgms. per 100 cc.	Plasma. Lipase. cc. N/10 NaOH	Urine. Total N.	Urine. Per cent. as urea.	Urine. Per cent. as NH_3.	Urine. Undetermined N per cent.	Urine. Diastatic Index.	Urea Test.	B.P. (systolic).
22.	27	2nd	8/12/20	23.2	—	—	—	—	—	—	—	—	2.1	—
			11/1/21	26	27	89	.38	5.28	76.2	4.3	5	5	1.9	169
			28/1/21	31.5	—	116	.27	—	72.4	5.9	22	5	—	185
			1/2/21	—	—	—	—	6.04	80.1	3.7	16.2	6.6	1.4	182
			6/2/21	37.5	39	114	.22	—	74.4	5.0	20.6	2	—	180
			21/2/21	34	—	91	.28	—	—	—	—	4	2.1	139
			16/3/21	28	—	—	—	—	—	—	—	3.3	2.0	—
23.	24	1st	18/8/21	—	—	—	—	—	34.8	14.4	50.8	10	—	—
				63.5	57	87	.27	—	32.1	18.9	49.0	100	—	150
			20/8/21	60.5	53	112	—	—	79.5	7.5	13.0	28	—	154
			21/8/21	—	—	—	—	—	73.4	11.2	15.4	28	—	—
			31/8/21	—	—	—	—	—	—	—	—	10	2.4	—
			8/9/21	30	—	—	—	—	—	—	—	10	2.7	112
24.	41	1st	7/11/21	50	47.6	88	.26	—	84.9	4.1	11.0	3.3	—	215
			8/11/21	36	41	99	—	—	71.8	6.0	22.2	10	—	208
			12/11/21	—	—	—	—	—	79.4	8.0	15.6	10	—	170
			14/11/21	—	—	—	—	—	—	—	—	—	1.9	—
			21/11/21	28	—	—	—	—	—	—	—	5	2.1	144
			7/12/21	—	—	—	—	—	—	—	—	—	2.3	132
25.	19	1st	4/9/21	—	—	—	—	—	81.1	3.6	15.3	28	—	—
			5/9/21	39	41	60	.35	—	67.2	7.6	25.2	10	—	130
			6/9/21	—	—	—	—	—	—	—	—	—	2.8	—
			12/9/21	33.5	37.8	69	—	—	—	—	—	10	3.0	123
26.	33	3rd	29/3/21	30	36	87	.34	—	79.3	7.5	13.2	10	—	193
			18/4/21	—	—	—	—	—	—	—	—	6.6.	3.1	130
27.	25	1st	14/3/21	43	38.5	99	.47	—	74.4	7.5	18.1	10	—	160
			1/4/21	24	—	57	—	—	—	—	—	5	3.5	108

Extra-Genital Chorion-Epitheliomata of Congenital Origin.

(With Report of a new case of Chorion-Epithelioma in a Male.)

By

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THE chorionic epithelioma is a tumour of exceptional importance. As MacCallum [1] points out, "it seems to offer an extremely interesting border-line condition, the comprehension of which might throw much light upon tumour growth in general."

Through the work of Marchand,[2] Aschoff [3] and Teacher,[4] the origin of these growths from fœtal epiblast is generally recognized and the name chorionic epithelioma or chorion-epithelioma has been substituted for the older deciduoma malignum. In its typical form the tumour is built up of cells of two types representative of the syncytium and Langhans' layers of the trophoblast which covers the chorionic villus, without fibrous stroma and without blood-vessels. It is an extremely malignant growth, rapidly destroying the tissues in which it arises and in a large proportion of cases giving rise to secondary growths in the lung. These metastatic growths exhibit the features of the primary tumours, including hæmorrhage and necrosis.

In a large proportion of cases the tumour occurs in direct relation to a pregnancy, abortion or hydatidiform mole (its innocent homologue). This relationship is usually more or less direct, the chorion-epithelioma following the pregnancy, abortion or hydatidiform mole in the uterus within a few weeks or months. Occasionally the relationship is more remote, as in a case recently published by Koritschoner [5] in which the malignant growth developed 22 years after the last parturition.

Occasionally also the tumour shows itself first, not in the uterus, but in some other situation, as the vagina (Pick),[6] lung and brain

(Eeichhorn),[7] liver (Fischer),[8] brain, lungs, liver and Kidney (Davis and Harris).[9] These cases of extra-uterine chorion-epithelioma in relation to pregnancy are variously explained by—

1. A primary tumour of the placenta removed along with that organ (Schmorl).[10]
2. Normal chorionic villi washed away into another part of the body where they may remain latent for a time and later develop malignant characters (Marchand, Pick). In this connexion it is of interest to note that Schmorl,[10] investigating lungs of 150 cases of pregnancy, found that only in two cases was there evidence of proliferation in the placental emboli. He considers that it is only altered placental cells, *e.g.*, those from a myxoma of the chorion, that give rise to such proliferation, but that this myxoma formation may be a very partial process, confined to a small area of the placenta.
3. A primary growth in the uterus which is either removed by curettage or undergoes spontaneous cure. In relation to this last point, it is of interest that, although so malignant locally and generally, the tumour, both in its primary site and in its secondary deposits may retrogress and disappear.

Although most commonly related to a pregnancy, abortion or hydatidiform mole, quite a number of cases have been described in which such relationships could be entirely excluded. These non-conceptional chorion-epitheliomata occur in both sexes, and, curiously enough, are most frequent in the male. A majority are met with in the testicle, but the ovary, the liver, and the mediastinum are situations in which they also occur. Langar,[11] discussing the male cases, considers that of the few recorded cases in which the primary focus appears to have been elsewhere than in the testicle, a testicular origin could be excluded with certainty in only one. A recent case of this kind is that described by Parkes Weber.

Most of these cases, both male and female, arise in relation to teratomatous new growths. These teratomata, which give rise to chorion-epitheliomata, as is the nature of such tumours, occur mainly in the gonads—ovary and testicle. The testicular cases are much more common than the ovarian ones, probably because the testicle is more exposed than the ovary and hence more liable to injury. An excellent summary of cases in both situations is to be found in a paper by Bonney.[12] The age of the patient is a striking feature in these cases. Practically all are under 40 years. One of the ovarian cases was a girl of 9 years (Pick),[13] another was a girl aged 16 (F. Michel).[14]

An analysis of 14 testicular cases in which the age is mentioned

gives 27 as the average. The oldest case was aged 43, the youngest 16. The tumour is therefore one which occurs at an age much earlier than other malignant growths.

It is interesting to note that the testicular tumours may not cause enlargement of the testicle. This was so in a case recorded by Dillmann.[15] The main tumour was in the epigastrium. There were secondary growths in the lung, but not in the liver. The primary growth, which was the size of a cherry-stone, was in the left testicle, but it did not cause any enlargement of the organ.

The cases occurring outside the gonads are few in number. Most of these also occur in relation to teratomatous growths. Excluding those which occur in relation to pregnancy, however remote, the following are the cases hitherto published :—

Congenital Extra-Genital Chorion-Epitheliomata.

Author.	Journal.	Summary of Case.
Parkes Weber.	*Practitioner*, 1918, Vol. 101, No. 1, p. 31.	Male, æt. 23 years. First symptoms developed a fortnight before death—weakness, hæmoptysis, then hæmatemesis and melæna. Hæmorrhage into peritoneal cavity. Liver greatly enlarged with numerous hæmorrhagic tumours scattered through it. *No abnormality of testicles.* Immediately below and to the left of the bifurcation of the abdominal aorta was a mass as large as a cricket ball with the same hæmorrhagic appearance.
Bonney.	*Trans. Path. Soc. Lond.* 1907, Vol. 58, p. 9.	Male, æt. 69, primary growth in great omentum, size of a man's head, deep red in colour and soft in consistence. Liver contained a number of metastases also hæmorrhagic in appearance. There were no other metastases. *Both testicles were incised, but nothing was found.* Only a small part of the primary growth was examined, but no teratomatous elements were found.
Bostroem.	*Verhand. d. deutsch. path. Gesellsch.*, Karlsbad, 1902, Vol. V., p. 212.	Male, æt. 28. Tumour in brain, retroperitoneal glands, lungs, liver and kidneys. None of these tumours could with certainty be called primary. *Testicles examined—no abnormality found.*
Eichhorn.	*Zeitschr. f. Krebsforschung*, xiii, 1913, S. 42.	Female, æt. 32, married, 4 children living. Last birth ten weeks before admission to hospital. No trace of tumour in uterus or other portion of genital tract. Growths present in lung and brain. In this case a pregnancy origin cannot be quite excluded as the growth may have originated from syncytial elements carried in the maternal blood-stream from the placenta to lung or brain.
Askanazy.	*Verhand. d. deutsch. path. Gesellsch.*, 1906, S. 58.	Male, æt. 19. Tumour of skull.
Djewitzki.	*Virchow's Archiv.*, 1904, Bd. 178, H. 3, S. 4, 51.	Woman, virgin, æt. 75. Primary chorio-epithelioma of bladder (posterior wall) with secondary growths in spleen, lungs, bronchial glands and sigmoid.
Ritchie.	*Journ. of Obstet. and Gynæcol. of British Empire*, London, 1903, iv, pp. 65—73.	Male, æt. 24, ill for 6 months. Dermoid in anterior mediastinum, part of which had become malignant, secondary growths in liver, lungs and spleen.
Hedinger.	*Correspondenz Blatt*, xliii, 1913, p. 346.	Male, æt. 23. Nodules present in kidneys, liver and lungs. Primary origin uncertain. *Testicles not examined, but clinically not affected.*
Davis & Harris.	*American Journ. of Obstet.*, 1900, Vol. 42, p. 1.	Female, æt. 40. Several tumours present in brain, lungs, liver, left kidney and thyroid. Believed left kidney to be primary site, but pregnant 14 times. Youngest child 14 months. (See Eichhorn's case.) Absolutely no change in uterus. (This case should probably not be included.)
Frank.	*Journ. of American Med. Assoc.*, 1906, 4 and 5.	Male, æt. 21. Mediastinal growth. Secondaries in lung and liver. No mediastinal dermoid found. *Testicles not examined.*
Askanazy.	*Presse Médicale*, Paris, 1908, Année xvi, p. 149.	The primary tumour was a chorion-epithelioma of the lung.

To these published cases we are able to add an account of one which came under our own observation.

In this case a testicular growth was excluded with certainty, and the primary tumour was situated behind the liver, arising there in all probability from an errant primitive germ-cell.

J. I., male, æt. 39, was admitted to the Edinburgh Royal Infirmary, under the care of Professor Russell. He was a cattleman by occupation and lived in a bothy with two or three others.

Family history. Father and mother had died at 50 and 60 respectively, cause unknown. One brother and two sisters were alive and healthy. One sister had died at age of 25 of "chill."

His personal history was briefly as follows: With the exception of slight colds patient had been well all his life until about six weeks before admission. He then began to be troubled intermittently with a pain in the right side, just "at the foot of the ribs." At first slight, the pain had gradually become worse until he sought advice at the Infirmary. It was only after admission to the Infirmary that he noticed any swelling in his abdomen. The swelling became rapidly larger after admission.

Patient stated that never at any time was he jaundiced and he had never suffered from piles or from swelling of the legs or feet.

Condition on admission. Patient was poorly nourished; his swollen abdomen gave the impression of greater fat than was the case. Skin cool and moist, appearance distinctly anæmic, and expression rather anxious. Before admission he occasionally had had a bad cough, but that had not troubled him lately.

Digestive system. Did not take his food well, saying it was due to his pain, but the taking of food did not seem to have much influence upon the pain. Site of pain was indicated by sweeping his hand over the epigastrium, especially towards the right. The pain had been present for six weeks, was of a stabbing nature, and was now constantly present. He had never suffered from eructations, and there had never been any vomiting.

His mouth was inclined to be dry and dirty. The tongue was slightly coated all over, and the teeth were very bad.

Examination of abdomen. The abdomen was markedly swollen and projected anteriorly, especially in the epigastric region. There was dense resistance in upper part of abdomen, but the lower edge of the liver could be felt 4 ins. below the costal margin. The abdomen was very tender, especially in the right hypochondrium, and there was a slight fluid wave in the flanks.

The notes on the examination of the liver were as follows:—

"Hepatic region bulged markedly, and was very full.

Palpation of anterior edge.—Lower edge 4 inches below costal margin in mammary line, and from thence it sloped up to the

umbilicus and thus across to the left side of the abdomen. The edge was sharp and the surface of the organ smooth. There were no swellings or projections. Gall-bladder not noticed. Liver very tender, and moved slightly with respiration."

The spleen could not be palpated, and accurate percussion was impossible owing to large size of left lobe of liver.

Patient complained of slight breathlessness, but there were no other signs of circulatory disturbance, and the heart appeared normal, both to auscultation and percussion.

Lungs. There was loss of vocal fremitus and impairment of percussion note at the right base posteriorly, and here also the breath sounds were faint, though normal elsewhere.

A needle was put in at the right base, but no fluid was obtained. There was no sputum, and, therefore, no examination of it was possible.

The nervous system was found to be normal.

Progress. The liver rapidly enlarged and became more painful. A needle was put into the liver and blood-stained fluid drawn off, the syringe being easily filled, and the fluid under a certain degree of pressure. The report stated that large cells resembling amœbæ were present. A second specimen was obtained in a similar way a few days later, and on this occasion no such cells were found.

The pain now became so severe and continuous as to require the frequent administration of Heroin. Slight jaundice made its appearance, the liver became excessively tender, the least touch causing agony, and on the 30th day after admission the patient died, after having been delirious during the previous 24 hours.

Post-mortem. Abdominal cavity was found to be filled with fluid and clotted blood. Blood-clot was especially adherent to the under surface of the liver. There was slight excess of fluid in the pleuræ and scattered hæmorrhages beneath the pleura on both sides. The left lung showed œdema, the right showed collapse in the lower part with œdema and congestion. There was no evidence of any secondary deposits.

The liver was enormously enlarged, and showed several tumour-like masses, visible through the capsule.

On section very large tumour masses were seen; some of these consisted of large spaces filled with fluid blood. The smaller tumour masses had a dark-red appearance with some pale-pink areas. All sizes of these growths could be seen—from a minute point up to a large orange.

Immediately behind the liver was a large mass, apparently enclosed in a fibrous capsule, and containing material similar to that found in the liver tumours. In addition there were several

large glands behind the peritoneum infiltrated with growth which had the same appearance.

The heart showed a degree of brown atrophy.

The testicles were carefully examined, but no abnormality was found, either to the naked eye or microscopically.

Microscopic Appearances.

1. *Section through cyst wall and adjoining part of the cyst contents.*

The cyst wall is composed of fibrous with a little muscular tissue. It contains numerous blood-vessels, lymphatics and nerves and accumulations of lymphoid cells and fat. Many of the larger blood-vessels contain villi (Fig. 1), usually one, but in one large

Fig. 1. Villus in vessel in cyst wall. The core of the villus is non-vascular and fibrous, and has a covering of fœtal epithelium.

vessel three villi are present; one of these has destroyed the wall of the vessel in its vicinity and invades a lymph gland in the neighbourhood. As a rule these villi are extremely fibrous, but a few are more cellular in structure, and in fact differ little from the villi of a normal placenta with one important exception, that none of them contain blood-vessels. There is usually, however, a more or less marked layer of fœtal epithelium. This epithelium generally consists of masses of individual cells, small in size, more or less rounded or polygonal in shape, and of rather indefinite outline. Their nuclei are fairly large relative to the cell body, and in many, nuclear figures can be distinguished; other nuclei

stain so darkly with the hæmatin that their structure appears homogeneous. In some of the larger cells two nuclei can be seen lying side by side, in each of which there are well-marked mitotic figures. The cell body stains more lightly, and in sections stained with hæmatein and eosin, takes on a reddish-blue colouration. These cells probably correspond to the Langhans' layer of the trophoblast, but are smaller and less definite in outline than the usual Langhans' cell found in malignant specimens of hydatidiform mole or in chorion-epitheliomata originating in the uterus. As we shall see later, they also differ in size and general appearance from the Langhans' cells found under the cyst wall, and invading the contents of the cyst in the present specimen. Yet there can be no doubt that they are Langhans' cells, and one of their numerous variations. This is proved by the position which they occupy in relation to the cores of the villi.

These individual cells form the greater part of the covering of the villi. Indeed it is not quite correct to say that they cover the villi, as they frequently lie apart from them at a short distance away, only a small mass of cells here and there retaining their connexion with the mesodermic core. The probability is that the main masses have been detached by the blood-stream. There are also found syncytial masses in which the nuclei are smaller than those of the small Langhans' cells, and the protoplasm more definitely eosinophile, while with a high power it is seen to have a foamy or alveolar appearance. It is remarkable, however, how little syncytium is present in the vessels of the cyst wall, only one or two vessels contain any at all, and this is frequently adherent to the core of the villus, forming for it a thin covering. Occasionally it is found separate from the core, and in these cases is generally arranged around the masses of Langhans' cells forming for them a kind of cap or covering.

At one part of the cyst-wall a large vessel is seen in which lie three villi with large numbers of the small type of Langhans' cell attached or lying in the vicinity. This vessel lies in close proximity to a lymphatic gland. The villi and their attached epithelium have destroyed part of the vessel wall and thus eaten their way into the gland tissues. The cells forming the vanguard of the invading mass have undergone necrosis *en masse*, possibly on account of the action of the lymphoid tissue with which they have come in contact upon reaching the gland. It may also be accounted for by the massive development of these cells, so that some product of their own metabolism, accumulating focally, acts destructively upon the cells themselves, although in some places the necrosis appears to be related to the vascular supply in the sense that islands of tumour cells, staining well with a vessel in their

centre, are found in the midst of a necrotic focus. In other parts apparently permeable vessels are found with only dead cells in their neighbourhood.

In one vessel a peculiar looped arrangement of the individual cells is seen. We shall see later that this is a frequent finding in the lymphatic glands attached to the cyst wall (Fig.), and its significance will be discussed in that connexion.

Immediately underneath the cyst wall, and in contact with it, is an almost continuous and irregular layer of chorionic epithelium. It consists of (Fig. 2):

Fig. 2. Section through wall of cyst, showing small part of cyst wall and irregular masses of chorionic epithelium (synctium and Langhans' cells) lying immediately underneath it.

1. Small masses of protoplasm syncytium of irregular outline, and containing numerous nuclei. The nuclei are small and oval or rounded in shape, stain dark blue with hæmatin, and in several mitotic figures can be distinguished. Some of the nuclei are evidently about to undergo mitotic division, and in others mitotic division has evidently just taken place, and the two resulting nuclei lie closely approximated or even superimposed one upon the other. The protoplasm of these syncytial masses is lightly staining and eosinophile. In some parts it has the alveolar or foamy appearance above described, while in other parts the protoplasm appears finely but distinctly granular.

2. Mixed indiscriminately with these syncytial masses are large numbers of Langhans' cells. They lie singly or in masses, forming

a more or less perfect mosaic pavement and vary much in size, shape and general appearance, some containing a deeply staining dense protoplasm, others being highly vacuolated. They are usually mononucleated, but sometimes contain two or more nuclei, and it is then impossible to distinguish them from syncytial masses. Indeed it seems not unlikely that syncytial masses can arise from Langhans' cells by a mitotic division of the nuclei without division of the cell body. Masses of Langhans' cells are frequently surrounded by syncytium, the latter forming, as it were, a cap or covering for them.

3. At one part of the section there are cells that differ in appearance from either of the forms above described. They lie in closely-packed masses, and have a hyaline-looking protoplasm that stains a very pale-blue with hæmatin. The nucleus also stains more lightly, so that the cells bear a very close resemblance to decidual cells, and the resemblance is accentuated by the fact that they have the same compact arrangement that is characteristic of decidua. That they are not decidual cells, however, but merely one of the many variations that Langhans' cells can undergo is proved (1) by their situation,—they are situated only amongst the cyst contents, never in the cyst wall which in this case may be conceived as corresponding to the uterine wall in the ordinary uterine chorion-epitheliomata; (2) by the fact that they are found to shade off by easy gradations into the ordinary darkly staining Langhans' cells.

At many parts of the cyst wall the trophoblastic epithelium is invading by direct continuity, and in all these cases the invading epithelium has an appearance similar to that above described as occurring underneath the cyst wall.

The cyst. The contents of the cyst consist only of fibrinous and necrotic material containing many thin-walled blood spaces. The latter have probably arisen from vascularization of the cyst contents by vessels growing inwards from the cyst wall. They have a very thin wall composed of condensed fibrin without any endothelial lining. In many instances their walls are being eroded by the invading epithelium so that blood is poured out amongst the fibrinous cyst contents which then become mixed with extravasated blood.

Besides these blood-spaces, which are always small, there are others much larger and which have no definite boundary or wall. They contain blood cells in various stages of disintegration, and are apparently formed by the invading epithelium eating a space for itself, and in so doing destroying one or more of the badly-formed blood-vessels. These spaces are almost invariably lined by syncytium, and in some cases the syncytial lining is necrotic or has even disappeared altogether.

The chorionic epithelium is freely invading the cyst contents. It invades them much more freely than it invades the cyst wall, apparently meeting with less resistance than in the latter. Thus if we conceive of the cyst contents representing the remnants of the included embryo or part of an embryo, the trophoblast is invading not only its host, but is also invading and destroying its own tissue, and after all there is no reason why it should *not* do so.

Liver. Sections of the liver show areas of unchanged liver tissue which at places is being eroded by masses of trophoblastic epithelium. The appearance of the epithelium is very similar to that found amongst the cyst contents, the three types of cell previously described being represented, the Langhans' cells in this instance also being frequently surrounded at least in part by unchanged syncytium. But when blood-spaces are lined by fœtal epithelium, the Langhans' cells are outside and the syncytium inside; in other words, the syncytium is next the blood-stream. In one vessel in the section there are seen small rounded cells (Langhans' ?) similar to those found in the lymphatic glands and cyst wall, and having a similar " looped " or alveolar arrangement.

The more normal parts of liver tissue show well-marked toxic change, as indicated by swelling of cells and granularity. There is also patchy congestion, more especially in the neighbourhood of the invading tumour, and there is pigmentation of the liver cells probably due to bile, also marked in the neighbourhood of the invading tumour. There is a certain amount of small cell infiltration in the portal tracts, but in the immediate neighbourhood of the tumour masses there is little or no evidence of reaction.

Appearances in the Lungs.

Here and there the alveoli contain serous fluid with no corpuscular elements except red cells in a few places where bleeding has taken place.

There is no metastatic tumour, in the true sense of the word, in the lungs. But many tumour cells are found in arteries, sometimes free in lumina, but sometimes enclosed in thrombotic capsules. These cells look much smaller than those in the primary growth, and have a round, oval or irregular-shaped nucleus and a narrow layer of protoplasm; especially those found free in blood are star-shaped, possessing many protoplasmic processes, and in some of them the nuclei do not stain well, apparently due to degeneration. Also karyorrhexis can be seen at the same time. Only a few lymphocytes are seen and sometimes a little fibrin mass accompanying them.

These thrombotic masses show several stages of organization. The recent ones consist of a fine granular mass with a few

lymphocytes, and contain a number of the tumour cells. A thrombus, which is a little older, looks fibrinous, and is stained more weakly by eosin than the fresh one, and is penetrated by many leucocytes. The nuclei of these tumour cells are polygonal and shrunken. The thrombus, further, is substituted by fibrous tissue, proliferated from the vessel wall. These connective-tissue fibres also penetrate between the tumour cells. The cell degeneration becomes more distinct, the nuclei shrink or stain palely or are broken up, while the protoplasm looks foamy, and sometimes we see only *débris* of cells consisting of a pale stained red mass without any remains of nuclei. It is to be noticed that these cells and cell *débris*, owing to their shrinkage, do not fill up the meshes of the surrounding connective-tissue. Though most of the tumour cells in the thrombus are more or less degenerated, we can find, at the same time, cells looking quite healthy, and in one partially organized thrombus a tumour cell shows a mitotic figure. Further, we observe that several arteries are obliterated by fibrous tissue, and two or three capillaries are going through it. There is no tumour to be found here.

Now it is a well-known fact that chorion-epitheliomata, primary as well as secondary growths, microscopically diagnosed from the tissue obtained by a partial excision, can spontaneously disappear, and the patients are permanently rescued from this fatal disease. Even the lung metastases disappear not infrequently. (Marchand and Everke,[16] Riesel,[17] Fleischmann,[18] Hormann,[19] Labhardt,[20] Michel,[21] Teacher.[22]) On the other hand, chorionic villi are often found in uterine and in lung veins in normal pregnancy, especially after eclampsia. But as the actual development of them as tumours is not so often seen, authorities consider that most of these emboli must be absorbed without further proliferation. How this can be done has been studied by only a few authors. In 1903 Prof. M. B. Schmidt [23] published a monograph, in which he dealt with the analogous question in relation to carcinoma. He concludes as follows: "When there exists a carcinoma in an abdominal organ the washing away of carcinoma cells into the small lung arteries occurs more often than we supposed. Only a small part of these cells forms metastases, while the bulk are either destroyed by organization of thrombus surrounding them, or encapsulated, and in spite of their proliferating power still being preserved, are rendered harmless, or they grow forward through the organized thrombus into capillaries and veins, and can give rise to secondary tumours in the sphere of the systemic circulation. These all can occur without macroscopic change in the lung."

This opinion was approved by many later writers, and recently Kikuchi [24] found the same process in the case of

chorion-epitheliomata. Whatever the diagnosis of our tumour may be, there is no question that those tumour cells found in the lung arteries are mostly destroyed by thrombus organization, but at the same time some of them still preserve their vitality, and in favourable circumstances can become the point of origin of metastatic growth in the lung or in the organs supplied by the systemic circulation, just as Schmidt discovered in his carcinoma cases.

Lymphatic Glands.

A section of one of the numerous lymphatic glands that lie external to the cyst-wall and closely adherent to it shows:

(1) Many of the blood-vessels of the gland—those in the interlobular septa—contain villi of extremely fibrous structure covered with epithelium, and both exactly resembling that found in the vessels of the cyst wall. The epithelium consists mostly of Langhans' cells of the small type, and little or no synctium is present.

(2) The gland substance is also filled with these small Langhans' cells, which in most of the interlobular spaces seem to have entirely replaced the normal lymphoid tissue. The latter is then found only in the interlobular septa or its neighbourhood. These small Langhans' cells so closely resemble lymphocytes that they might easily be mistaken for them if the normal lymphocytes were not present to contrast them with. They are then seen to be larger, twice or three times the size of the lymphocytes, less regular and rounded in outline, and more variable in size. They generally lie quite separate from each other, not in masses, though at one part of the section a closely-packed mass of them can be seen, the cells here fitting into each other closely, and being larger and sometimes vacuolated. The mass is surrounded by small Langhans' cells. It is, in fact, questionable whether the two types of cells are identical. They differ so much in size and appearance, and there are no gradations between them. At all parts of the gland these tumour cells are undergoing necrosis. This necrosis is patchy in distribution, and apparently independent of obliteration of blood-vessels.

(3) At many parts the small cells assume the peculiar looped or tubular arrangement described above as occurring in the vessels of the cyst wall (Fig. 3). The cells composing the acini seem to be identical with the small type of Langhans' cells. These have also been described by other observers, and have generally been explained by them on the supposition that they are a glandular epithelium originating in the embryonic contents of the dermoid cyst. It should, however, be noted that these tubules bear a very

close resemblance to the primitive intestine of, say, a 1 cm. embryo. There is, indeed, no histological difference apparent between them either in the appearance of the individual cells or in their tubular arrangement. A remarkable difference exists also between the small type of Langhans' cell found in the lymphatic glands and the ordinary Langhans' cell that is found invading the cyst wall or the contents of the cyst. Indeed the difference between them is so great and the absence of any resemblance so striking as to raise in one's mind a doubt as to whether the former have any relationship to Langhans' cells at all. Again, there is the fact that there is never anything resembling syncytium present with them, and that they never lie in masses, but always separate from one another like enlarged lymphocytes.

3. Lymphatic gland showing cells with tubular or looped arrangement.

Their appearance may possibly be explained in one of the following ways : (*a*) That they are Langhans' cells modified by some action of the lymph gland by means of the lymphocytes contained therein. This might possibly account for their small size and for the necrosis referred to above, which is such a marked feature of the tumour cells in the glands. (*b*) That they have no connexion whatever with Langhans' cells, but are cells originating in the embryonic cyst contents. An examination of an early ovum shows that many of its tissues are composed of cells exactly resembling those under discussion. If this is the true origin of these cells it goes to show that not only has the fœtal trophoblast taken on malignant tendencies, but the embryonic remnants have

done so as well. Is the malignant tendency of the cell then not resident in the cell itself, but is it something communicated to it from outside? If it is inherent in the cell it is peculiar that it should express itself simultaneously in the trophoblast and in the embryonic tissues proper. That this simultaneous expression of malignant tendencies should occur occasionally would be in no way remarkable; but it is certainly remarkable that it should occur so frequently. It is obvious that there must be some common driving force giving rise to malignancy in both, or the removal of some restraint that prevents malignancy, and that has hitherto acted upon the trophoblast, as well as upon the embryonic tissues.

What may be the nature of this driving or restraining force? It is possible that it is to be found in a *disturbed balance of the internal secretions*. It is remarkable that embryonic inclusions, whatever their nature, should frequently lie dormant in the body of the host until adult or middle life and then become suddenly active; and it is possible that the age-changes, chemical and histological, that at this period of life have occurred in the ductless glands are the causal factor. A chemical and histological investigation of these changes in cases of malignant disease should yield interesting results.

The relationship of the internal secretions to malignant disease has been all but proved in the case of chorion-epithelioma of the uterus. It is claimed by many observers that this disease never occurs without the co-existence of an abnormal amount of lutein tissue in the ovary. Born and Fraenkel,[25] in 1901, showed experimentally that the lutein tissue of the normal corpus luteum by means of its internal secretion brought about the embedding of the ovum in the uterine wall. The frequent, if not constant association of excess of lutein tissue in the ovary in cases of uterine chorion-epitheliomata leads us to the assumption that the excessive and possibly abnormal lutein tissue gives rise to the deep penetration of the uterine wall that is characteristic of chorion-epithelioma in that organ.

Loeb,[26] experimenting on mice in which the cancer rate and cancer age through several generations had been observed, concludes that castration practised at the age of three or four months completly or almost completely prevented the appearance of carcinoma of the breast. The "normal" cancer rate in the particular strain of mice experimented on was from 56 to 80 per cent.! In mice castrated at the age of five or seven months cancer appeared, but in all probability the tumour rate was lowered and the tumours appeared later in life. In mice castrated above the age of seven months little or no effect was produced.

Loeb considers that the effect of hormones on the development

of cancer is a specific one, that a hormone influences the development of cancer only in those organs to which under normal conditions it has a specific relation, *e.g.*, testicle and prostatic cancer, thyroid and bone cancer, ovarian and uterine cancer, and, finally that internal secretion causes cancer only in co-operation with hereditary factors, and in certain circumstances with irritation (physical stimulation).

Histogenesis.

There are four possible theories by means of which the origin of such tumours as that under discussion may be explained.

1. That the primary growth arises from an included embryo, the latter thus representing the twin of the host in whose tissues it becomes embedded.

2. That it arises from an included zygote, this giving rise to a binovular twin.

3. That it arises from an included somatic cell which may be either: (*a*) toti-potential, viz., a cell capable of giving rise to a complete individual or to cells of every order; or (*b*) uni-potential, viz., capable of giving rise to cells of only one order—entoderm or ectoderm alone.

4. That it arises from a primitive germ cell.

1. *The "included twin theory."* The included twin is an embryological possibility, and indeed is recognized by teratologists as simply a variety of polysomatous terata arising from a second primitive streak appearing on the germinal area. Of these there may be many varieties which are classified by Ballantyne [27] as follows:—

(*a*) Those in which the parasite is attached to or embedded in the head of the autosite—cephalo-parasites.
and trachelo-parasites.
(*b*) Those in which the union is in the face or neck—prosopo-
(*c*) Those in which the union is in the thoracic region—thoraco-parasites.
(*d*) Those in which it is abdominal—gastro-parasites.
(*e*) Those in which it is pelvic—lecano-parasites.

In all these cases the parasite may be either attached to or embedded in its host, and in the latter case the inclusion may be complete or incomplete and projecting. The complete inclusion may consist of a more or less recognizable fœtus or only a mass of miscellaneous fœtal tissues. Included among them are such monstrosities as epignathus (rudimentary fœtus attached to the mouth), included fœtus or *fœtus in fœtu* (fœtus or teratoma contained in the abdominal cavity) and sacral parasites and tripod

fœtuses (more or less defective fœtus attached to the pelvic bones of the autosite.

Adami,[28] however, considers that only those embryomata which are in relationship to the great anterior median fissure, *i.e.*, whose situation is median—ventral, thoracic or abdominal—should be regarded as fœtal inclusions. He conceives of them as weaker and smaller embryos, carried into the body of the most fully-developed during the process of closure of the anterior median fissure. Thus teratomata having, for example, a retroperitoneal and more dorsal abdominal position, and also those which are posterior mediastinal or cranial cannot be explained on this supposition.

It is thus obvious that this theory is not sufficient to explain the origin of the retro-hepatic and retro-peritoneal teratoma in this case.

2. *Included zygote theory.* It is obvious that the zygote is a toti-potential cell, and as such can give rise to a complete embryo. It is, however, inherently improbable that if included in the tissues of its host, it would lie dormant for a period of years as cell inclusions frequently do. Its tendency is to undergo cell division immediately and continuously, having had the stimulus of fertilization, so that the resulting teratomatous formation should take place simultaneously with the development of the host. In our case it is possible that the teratomatous formation was present from birth, though improbable on account of the absence of history pointing to pressure symptoms. Moreover, it is extremely improbable that the second zygote in the case of binovular twins could pass through the trophoblastic covering of the host, which would obviously be necessary in order that it might be included in the tissues of the latter.

3. That it arises from an included somatic cell which may be either toti- or uni-potential.

It is probable that the first division of the zygote is into the mother cell of the trophoblast (ectomere), and the mother cell of the embryo proper (endomere), so that no cell except the zygote can be toti-potential in the sense that it can give rise to embryo plus trophoblast. Moreover, if we accept the view that the endomere first of all gives rise to the primitive germ-cell mass on the one hand, and the somatic cell mass on the other, it is evident that no cell except the endomere can be toti-potent even in the sense of producing a complete embryo minus trophoblast. All that any merely somatic cell can give rise to is an embryo without primitive germ cells, therefore without the power of reproducing itself, and hence, in that sense, an incomplete individual. If, therefore, we use the term " toti-potential " in the sense of a cell that can give rise to cells of *every* order, namely cells of the embryo proper, primitive germ cells, and trophoblast it becomes evident

that no cell except the zygote, or, in certain circumstances, an *un*-fertilized gamete (see under 4) can be classed as toti-potential. It is best to confine the latter term to cells that are toti-potential in the strict sense above defined, and to use the term "*tri-potential*" for somatic cells that are so undifferentiated as to be capable of producing endoderm, ectoderm and mesoderm, but *not* trophoblast or primitive germ cells.

The inclusion of a tri-potential or uni-potential cell is also insufficient to explain the origin of the present case containing, as it does, all three embryonic layers plus trophoblast. Besides, it here also appears improbable that either the tri-potential or uni-potential cell will consent to lie dormant for a period of years before resuming the activity that is characteristic of it. None of these theories explain, therefore, those cases of, *e.g.*, testicular teratomata, in which the tumour formation only becomes manifest in adult life.

4. That it arises from a primitive germ cell.

Among the cells of the morula mass are primitive germ cells that cannot be differentiated from the somatic cells. In many of the lower forms, *e.g.*, nematodes, they can be distinguished by the possession of germ cell determinants. In the skate it has been shown that the primitive germ cells, derived from the first division of the zygote, travel along the blastomere and yolk sac, until they reach the ovary upon the Wolffian body (in the female). There they penetrate into the substance of the ovary forming therein the primitive ova. It has also been shown that in the skate some of the primitive germ cells during their migration to the ovary may lose their way, as it were, and getting into abnormal situations, remain there into adult life as cell inclusions.

It may be supposed that, like the primitive ovum in the normal situation, it lies dormant until puberty, receiving at that time, or later during sexual life, a stimulus which causes it to undergo maturation and form the female gamete.

This is the only theory that accounts for the greater frequency with which teratomata, including dermoids, are found in the gonads (ovary or testicle).

It is to be observed that it is usually during adult life that such ovarian tumours are found, though they have been detected as early as the eighth month of intra-uterine life, and it is possible that these comparatively rare cases in children could be accounted for by the accidental inclusion of a tri-potential or uni-potential cell, which would thus tend, unlike the primitive germ cell, to develop immediately to the fullest possible extent. Assuming then that the primitive germ cells can be displaced on their journey to the gonads, and thus retained in abnormal situations, it becomes

necessary to answer the question, what stimulus leads to the segmentation of the unfertilized gamete?

It has been shown by the work of Loeb [29] and others that the ova of various organisms are capable of segmenting and developing into new individuals without the intervention of a male germ cell. Thus in the silkworm moth parthenogenesis occurs occasionally under normal circumstances, and Janosik [30] has recorded segmentation without fertilization in the ovarian ova of mammals. Hertwig [31] showed that if the ova of various Echinoderms are treated with 1% solution of strychnine sulphate, and then restored to normal sea-water, they will frequently show signs of segmentation. Loeb succeeded in producing plutei from the unfertilized eggs of sea urchins, by treating them with butyric acid for 15 minutes at 15°C., transferring them to pure sea water for ¼—½ hour, then to hypertonic sea water, and finally, after half-an-hour, to pure sea water again. Bataillon [32] found that the unfertilized eggs of the lamprey, and also those of the frog, can be made to undergo segmentation as far as the morula stage by depositing them in salt solution of such a concentration that they lose water. Professor Arthur Robinson informs us that he has frequently observed parthenogenetic segmentation taking place in the ova in the ovarian follicles of the rat. It is not, therefore, difficult to believe that parthenogenetic development may occur in human ova placed in abnormal surroundings, and even in ova normally situated, when the surrounding ovarian tissue is in some way abnormal.

It is, therefore, probable that in our case the teratomatous formation originated in an abnormally situated primitive germ cell, that had undergone parthenogenetic segmentation.

We are guided to this conclusion by the fact that it is situated posterior to the liver (which excludes the included uniovular twin), that it contains all three layers of the embryo plus trophoblast, and that it apparently developed only in adult life.

Conclusions.

1. A testicular tumour as the primary source of the growth is with certainty excluded in our case.

2. The primary tumour is situated behind the liver, and probably originates in an abnormally situated primitive germ cell.

3. The latter has, without fertilization, undergone development, producing a teratoma containing all three layers of the embryo plus trophoblast.

4. The stimulus for division of the primitive germ cell (gamete) has probably been found in the abnormal (not ovarian or testicular) tissue by which the gamete was surrounded.

5. The cause of the malignant transformation of the teratomatous formation may be found in the little understood disturbed balance of internal secretions, occurring in adult and especially in middle life.

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The After-results of the Removal of the Uterine Appendages in Hysterectomy for Uterine Fibroids and Chronic Metritis.

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I. Introduction.

I feel that this investigation, though incomplete and largely a follow-up of much previous work on this subject, may be of help in forming what is often a difficult decision; that is, the necessity or advisability of leaving some ovarian tissue when performing hysterectomy.

I am indebted to Professor A. Donald for his suggestion that I should undertake this investigation, and to the Honorary Staff of the St. Mary's Hospitals, Manchester, I wish to express my thanks for permission to make use of their cases, and for their help and advice.

It has become an almost universal practice in the St. Mary's Hospitals, Manchester, for the past seven or eight years, in the operative treatment of uterine fibroids and chronic metritis, to remove both tubes and ovaries in addition to performing hysterectomy whether these organs are in an apparently healthy state or not.

As so many gynæcologists hold that at least one ovary should be left in these cases, claiming that the absolute sterilization of a woman leads to certain injurious and, in some cases, lasting results, it seemed to me that it would be instructive to investigate a large number of the cases treated by operation for fibroids and chronic metritis in the St. Mary's Hospitals.

With the permission, therefore, of the surgeons of the Hospital, I collected 300 of these cases, which had been treated in the Hospital during the years 1909—1913 inclusive. I sent to each patient a printed list of questions to be answered, and received 231 replies. The average age of the women written to was 39 years, and all were under 47 years, which I took to be the average age for the

occurrence of the menopause (Leith Napier [1]), some being quite young women under the age of 20 years. None had ceased to menstruate at the time of operation, and several were suffering from menorrhagia, pain or chronic discharge or some form of discomfort from the uterine condition, either fibroid or chronic metritis.

In the cases collected by me five different types of operation had been performed. Of the 231 cases which sent replies *186 had both their ovaries and tubes removed.* Of these 186 cases—

Abdominal or vaginal total hysterectomy had been performed in ... ... 8 cases.
Sub-total or supra-vaginal hysterectomy had been performed in ... ... 178 cases.

The remaining 45 cases had either one or both uterine appendages left.

Vaginal hysterectomy with removal of one appendage had been performed in ... ... 2 cases.
Supra-vaginal hysterectomy with removal of one appendage had been performed in ... ... 3 cases.
Vaginal hysterectomy with both appendages left had been performed in ... ... 40 cases.

The small number of cases in which one or both appendages had been left is unfortunate for purposes of comparison with the type in which both had been removed, but, as I stated at the outset, the latter has been an almost universal procedure in the St. Mary's Hospitals of late years.

For purposes of comparison these five types may be taken in two groups:—

A. Cases in which one or both ovaries have been left.
B. Cases in which both ovaries have been removed.

These two groups correspond respectively to the conservative and radical schools of gynæcology. Each school claims certain advantages for its own procedure and credits that of the other with disadvantages. Before entering upon a comparison of the results of the two procedures as obtained from my investigation I will state as I understand them, the views of these two schools.

A. *The Conservative School.*

Advocates of conservative gynæcology hold that at least one ovary should be left when performing hysterectomy, maintaining, in the first place, that, if this is done, the general health of the patient is better than if both are removed, and that patients so treated are less liable to suffer from alteration of temperament, depression and lassitude. Hot flushes and sweats, the most serious annoyance of the artificial menopause, are said not to occur in the

conservative procedure, also nervous troubles to be avoided, and no effect to be produced on the sexual relationships of the patient.

B. *The Radical School.*

Radical gynæcologists remove both appendages in addition to performing hysterectomy whether the appendages are diseased or not. In support of their procedure they claim that the adverse effect on the patient's general health and ability for work and the depression, if any, produced are little, if at all, greater than in the conservative procedure. With regard to flushing and sweats and nervous troubles, they say that while these occur whichever method be adopted, the gravity of their frequency after this procedure does not outweigh the advantages in other directions to be detailed later. The same attitude is taken towards the sexual question. The additional advantages which they claim are, that in some cases in which both appendages have been removed, there is less or no pain afterwards, that the operation is cleaner in that a smoothly peritonized pelvic floor is left, and, most important, that the possibility of the remaining appendage causing further trouble by retrograde changes is avoided. In the last connection radical gynæcologists are of the opinion that such appendages deprived of, if not all, at least their most important function by the removal of the uterus, tend to degenerate and give rise to the necessity for a further operation.

II. The Symptoms of the Normal Menopause.

I have endeavoured to collect evidence both for and against the removal of both ovaries. The severity of the symptoms of the normal menopause it is difficult to obtain reliable evidence of, as patients accept these symptoms as inevitable in most cases, and they do not come under the notice of medical men.

Taylor,[2] quoting Kelly, says: "The climacteric disturbances are not necessarily any worse when produced by operation than when occurring as the result of normal changes; but they are caused in the one by the surgeon and in the other by a natural law. Much more consideration and criticism therefore is directed to them in the one case than in the other. There are a very considerable number of women who are greatly improved by the change of life occurring at the normal menopause. Neurasthenic women seem to suffer the most, and the nearer the patient is to her natural menopause the less the severity of the symptoms." "In workers disturbances are passing, final results good."

Tilt[3] finds the average duration of the normal menopause is from two to five years. He states that flushes are present in more

than half the women at the normal menopause, nervous irritability occurred in 459 out of 500 women, and congestive headaches were very common.

Leith Napier [4] states that leucorrhœa occurs in 15%, and diarrhœa, indigestion and vomiting in 20% at the menopause.

Herman [5] states that the flushes are of $\frac{1}{2}$—3 minutes duration, occur 10—12 times per diem and last about two years after operation.

The foregoing facts make it difficult to say whether the artificial menopause is of much greater severity than the normal.

III. The Functions of the Ovaries.

Before investigating the effect of removing the ovaries it is as well to consider their functions. The conclusions of Swale Vincent [6] are summarized in the following paragraph: "In addition to its function of forming ova the ovary is an organ furnishing an internal secretion or secretions which affect the general metabolism of the body and control the nutrition of the uterus. The secretion determines the processes of the œstrous cycle and the general condition of the female organs of generation and the mammary glands. The corpus luteum is an essential factor in maintaining the raised nutrition of the uterus during the earlier stages of the period of gestation and so helps the fixation of the embryo. The corpus luteum also determines by a specific internal secretion the increased growth of the mammary glands after ovulation and impregnation."

How should these different factors weigh with the operator in removing the ovaries in performing hysterectomy?

1. *The formation of ova.* The need for retaining the ovaries for this purpose is lost when the uterus has been removed.

2. *The furnishing of an internal secretion.*

A. *Influencing the general metabolism.* Is this more adversely influenced after the removal of both ovaries in hysterectomy than when one is left? The results of my investigation seem to show that the difference is very slight, as will be shown later.

B. *Controlling the nutrition of the uterus.* This is superfluous after the removal of the uterus.

C. *Determining the œstrous cycle.* The need for this function ceases after hysterectomy.

3. *The formation of corpora lutea.*

A. *Influencing the next menstrual period.* The necessity for this ceases after hysterectomy.

B. *Controlling the fixation and nutrition of the ovum in the early stages of pregnancy.* The possibility of pregnancy has disappeared with hysterectomy, so this function also becomes needless.

Briefly then the only factor which we have to take into consideration in removing both ovaries is the effect on the general metabolism of the body; that is, the severity of the symptoms of the artificial menopause.

From the more recent writings on the question of removal of the ovaries one gathers that for the most part there is a definite opinion that healthy ovarian tissue should not be removed altogether.

Bond[7] writes: "When the uterus is removed and the ovaries left, there is greater rapidity of convalescence, smaller disturbance of nerve balance and a more complete return to health than is usual in cases where both uterus and ovaries are removed. . . . . Removal of the uterus alone does not appear to impair the sexual appetite, which, however, is lost when ovaries and uterus are both removed."

Haultain,[8] in a clinical and pathological analysis of a successive series of 120 abdominal hysterectomies for fibromyoma, says, with regard to this point: "The removal of the ovaries with the uterus must depend upon their situation and freedom from disease. In many cases it would materially complicate the operation to save them, and very frequently they appear so pathologically changed that one hesitates to leave them. The age of the patient must always have some guiding influence. After the age of 40 their removal does not seem to incur such distressing climacteric symptoms. In one of my cases in which they were left the patient died of sarcoma of the ovary four months after operation."

Peterson[9] concludes that at least 10% of all women who are regularly menstruating at the time of operation remain free from the troublesome symptoms of an artificial menopause after hysterectomy combined with removal of the ovaries. The symptoms of the artificial menopause are much less severe when the ovaries are retained after hysterectomy, but it is not necessarily true that after hysterectomy with removal of the ovaries the younger the woman the more she will suffer with the symptoms of the menopause. The greatest suffering appears to occur in women operated on between the ages of 40 and 44. The frequency and severity of the artificial menopause is not influenced in any way by the kind of hysterectomy performed.

Bland Sutton,[10] on the fate of belated ovaries, writes: "In

a woman under 40 a belated ovary remains active and produces ova. After this age it atrophies and menopause symptoms usually ensue after the operation. The retention of an ovary minimizes the menopause disturbances, and they are never so acute and prominent under these conditions as they are when the menopause is induced by the sudden and complete removal of all ovarian tissue."

Giles,[11] in a study of the after-results of abdominal operations on the pelvic organs, found that removal of the uterus in addition to the ovaries has no effect in diminishing sex instincts. The same author finds the sex instincts unaltered or increased in 82% when both ovaries are left, in 77% when one ovary is left, and in 78% when both are removed; in other words, a slight diminution in sex instincts in about 20% whether the ovaries are removed or not. In hysterectomy, with one or both ovaries preserved, the sex instincts are never altogether lost.

Donald[12] says: "I have investigated the later histories in a fairly large number of operations for the removal of the uterus for fibroid tumour, in which it is my custom to remove both ovaries, and I have found that the serious discomforts which are supposed by some to follow the radical operation did not occur except in very rare cases. The exceptional ones in which the sufferings might be described as acute were only found in highly nervous women. In some of the cases in which the complaints were most bitter, it was found that for some reason or other one ovary had been left."

Blair Bell,[13] on the pathological menopause as caused by complete removal of the uterus and ovaries, writes: "We remember one case in which an angiomatous fibromatous uterus in a woman about 30 years of age was removed completely in the belief that the growth in the uterus was sarcomatous. For years the patient suffered from the most violent symptoms, which were with difficulty controlled."

Alban Doran,[14] reviewing the after-histories of 300 cases of sub-total hysterectomy, concluded that when healthy at least one ovary should be saved. Herbert Spencer, at the same meeting, thought it was proved beyond question that the retention of the ovaries was of value to a patient, and was not immediately followed by flushings, whereas flushings usually occurred when the ovaries were removed.

The views of Polak[15] are:—

1. If one or both ovaries are healthy they should be conserved.
2. It is better to do total extirpation than to leave an unhealthy ovary.
3. In patients near the menopause total extirpation gives the best results.

4. Nervous phenomena are less marked if the patient is anæmic or toxæmic at the time of operation.
5. Symptoms of the artificial menopause are less marked when both ovaries are removed for pelvic inflammation than when the operation is performed for myomata.

Donald [16] refers to the advisability of leaving one or both ovaries. He says: "My own practice is to remove both with the uterus, unless the patient specially desires that one should be left. In quite a considerable number of cases the ovaries are diseased or degenerated, and if they are left there may be subsequent trouble from cystic degeneration; or the ovary may become adherent to the pelvic scar and cause so much discomfort that a subsequent operation may be necessary. When they are both removed the result is a clean pelvic floor with a linear scar running from one side of the pelvic floor to the other. My practice is based not on theory but on practical results."

IV. The Investigation.

Bearing these different points of view in mind, I proceeded to draw up a list of questions founded upon them. The questions were 13 in number, and were as follows:—

1. Have you ever had a monthly time since your operation?
2. Is your general health better or worse since your operation?
3. Can you do more or less work since your operation?
4. Have you become fatter since your operation?
5. Are you cheerful, irritable or depressed since your operation?
6. Is your memory any different since your operation?
7. Had you hot flushes or sweats after your operation? If so, how long?
8. Had you headaches after operation? If so, how long?
9. Had you indigestion after operation? If so, how long?
10. Had you any nervous troubles after operation? If so, how long?
11. Have you more or less pain since operation?
12. Have your relations with your husband altered? If so, how?
13. Have you any other trouble?

The first question was put to make quite sure that no mistake had been made in the description of the operation in the notes and to see if any periodical symptoms were observed by these patients. In every case but one the question was answered in the negative. In this case, age 22, supra-vaginal hysterectomy with removal of both appendages had been performed. She said that she was unwell every 21 days, very slightly. Her general health was better;

she was fatter; she was able to do less work than before; she felt irritable; her memory was normal; she had flushings rarely, and she still suffered from headaches, indigestion and had nervous troubles. She has less pain than before; her sexual instincts were normal, and she suffered from bad eyes.

No. P. 245 complained of monthly flushings and monthly headaches. One of her ovaries had been left and the uterus removed vaginally.

The second question with regard to the patient's general health since operation, the only one in the list which cannot be said to be a leading question, is to my mind a most important one. Many of the patients answered this question by saying that their general health had been better or very much better and then proceeded to give a list of adverse symptoms, which I should infer did not seriously embarrass them. Conversely, when the general health was stated to be worse or the same, the adverse symptoms were generally excessive. From this it seems fair to infer that the operation which most improved the general health is the one to choose. Whichever operation had been adopted the percentage of patients benefitting was very great. A comparison of the results of the radical and conservative operations in this connection is slightly in favour of the former, 91.9% being better or much better, as compared with 84.4%; while of those who were worse only 6.4% had the radical operation, 11.1% the conservative; and of those whose health remained the same 2.2% had the radical, 4.4% the conservative operation, again in favour of the radical procedure.

The third question was framed to ascertain the effect of the operation on the patient's physical capabilities. The results are distinctly in favour of a conservative procedure, for, whereas 46.6% of those who had the conservative operation were able to do more work than before, there were only 36.5% of those who had the radical operation; 39.7% after the radical operation found themselves able to do less work, as compared with 37.7% after the conservative operation, and 23.6% after the radical operation, as compared with 15.5% after the conservative were unaltered in this respect.

In asking the fourth question I wished to find out if the removal of both ovaries affected the tissue metabolism noticeably in the direction of excessive adiposity. I found this to be the case, many of the patients stating that they had become very fat indeed since operation. Thus 62.3% of those who had the radical operation had become fatter as compared with 44.4% of the conservative cases, or 17.9% more. I also found that 9.6% radical cases had become thinner as compared with 6.6% conservative cases, but this is counter-balanced by the fact that 48.8% conservative cases noticed

no alteration as compared with 27.99% radical cases, that is, 20.8% more.

The answers of the patients to the question whether they were cheerful, irritable or depressed since operation were, as might be expected, rather vague; but I accepted them literally. I found that 49.4% of the radical cases were cheerful, as against 40% of the conservative cases. On the other hand, 28.8% of the conservative cases were irritable, as against 26.8% of the radical cases; further, that 31.1% conservative cases remained the same as before, against 23.6% of the radical cases. The first two points seem to indicate that the preservation of the appendages has an adverse effect on the temperament, while with regard to those who found no alteration in this respect, it would be necessary to know their state of mind previous to the operation.

The effect of either type of operation upon the memory seems negligible. Of those who were unaffected one way or the other 72% had the radical, 64.4% the conservative operation; also only 27.5% radical cases were worse in this respect as compared with 31.1% conservative cases, again slightly in favour of the radical procedure. On the other hand, 4.4% of the conservative cases found their memory improved, against 1.6% of the radical cases. On the whole these results slightly favour the radical operation, though one is inclined to think that whichever operation be adopted is not of much importance as regards the effect on the memory.

Hot flushes appear to occur in a large majority of cases in which the uterus has been removed, even if appendages have been left in performing the operation. There is, however, a markedly less percentage in cases in which appendages have been left than when both have been removed. After the conservative operation 73.2% of the patients complained of flushes. After the conservative operation 26.6% had no flushes at all, after the radical operation only 8.6%. We thus have a considerable percentage more of the radical cases suffering from flushes than of the conservative cases, and, on the other hand, 17.9% more of the conservative than of the radical never suffered from flushes at all. I gathered from the replies that it was the most troublesome symptom of the artificial menopause. The question as to how long the patients had suffered from flushes since operation was often badly answered. I was able to divide the answers into :—

1. Those who suffered for a period under 12 months.
2. Those who suffered for a period over 12 months and were now better.
3. Those who still suffered, this being in every case for a period from 12 months up to five years since operation.

Radical operation.

1. Under 12 months 12.5%
2. Over 12 months 0%
3. Still flushes ... ... 75.0%—75.0%

Conservative operation.

1. Under 12 months 17.977%
2. Over 12 months 8.988%
3. Still flushes ... ... 64.606%—73.594%

A comparison of these tabulated results is in each case favourable to the conservative procedure.

The correctness of the replies to the next three questions as to the occurrence of headache, indigestion and nervousness after operation, is difficult to estimate, as most people suffer from these symptoms at various times. Their bearing on the operation is possibly in many cases doubtful. I have, however, taken the replies literally in every case and in such large numbers they are probably a fair index of the truth.

First, with regard to the frequency of headache after operation. In the conservative procedure I found that 59.8% of the cases, as compared with 51.2% of the radical cases, suffered. On the other hand, 48.9% of the radical cases had no headache at all since operation, as compared 40% of the conservative cases.

Secondly, indigestion occurs in a very small percentage of cases, whichever operation is adopted. I found that 37.6% of the cases after the conservative and 29.3% of the cases after the radical operation suffered from indigestion, again slightly in favour of adopting the radical procedure.

Thirdly, nervous symptoms, I was rather surprised to find, only occurred in a small percentage of the cases in either type, 34.9% of the radical cases and 39.9% of the conservative cases. Still the larger percentage in the conservative cases does seem to point to the fact that leaving the appendages gives rise to nervous troubles. This will be slightly in favour of the radical operation, though one has to remember that 34.9% of these also complained of nervous troubles.

The replies to the last three questions may have a bearing on the replies to question 2, about the general health. It has already been noticed that a larger percentage of patients having undergone the radical operation had enjoyed better general health since operation. This may account for the larger percentage after the radical operation who enjoyed freedom from headache, gastro-intestinal disturbance and nervous troubles.

A comparison of the two types of operation in respect of the amount of pain following either procedure is distinctly in favour of the radical one. Thus I found that while 82.2% after the conserva-

tive operation said they had suffered less pain, the percentage after the radical operation was 93, that is 10.81% more. On the other hand, 15.5% after the conservative operation complained of more pain, again 6.7% after the radical operation; and 2.2% after the conservative operation remained the same as before, against .5% after the radical operation. Whichever type of operation had been adopted then I found a very large percentage suffered less pain; that is, 93% and 82.2%; still the percentages are in favour of the radical procedure.

A very important question in connexion with total extirpation of the internal genital organs is whether such a proceeding affects the relations of the woman with her husband. I found that a considerable percentage of the patients were adversely affected in this respect, whichever type of operation had been performed, and that of those who had one or both appendages left a larger percentage remained normal. Thus after the conservative operation 73.1% remained normal, while after the radical operation only 60.8% were normal. Those who were adversely affected after the conservative operation formed 26.8%, after the radical operation 39.1%. These latter were affected in one of two ways—they either complained of loss of sexual desire or of dyspareunia. As I have stated, a larger percentage were affected after the radical operation, that is 39.1%; and of these 24.1% complained of loss of sexual desire, and 15% of dyspareunia. Of the lower percentage after the conservative operation, that is 26.8%, 17% suffered from loss of sexual desire, and 9.7% from dyspareunia. These figures then are unfavourable to the radical procedure. There is a factor which would tend to approximate the two results. Of those who had the radical operation performed 35.5% were unmarried, 33.3% being single women, 2.2% widows; while of those who had the conservative operation none were single, and 8.8% were widows. I was thus obliged to subtract from my radical cases 5% more than from my conservative in arriving at the true figures in answer to this question. The result of the figures, however, is in favour of leaving the appendages.

The following is a list of the "other troubles" of which patients complained, and as none of them appear to have any bearing on the point at issue I give them without comment:—

Vaginal discharge	7, *i.e.*, 3%
Pain in the back	7
Abdominal pain	3
Prolapsus uteri	3
Falling kidney	1
Increased micturition	1
Difficult micturition	3

Bad kidneys	1
Bladder trouble	1
Dyspepsia	3
Constipation	10
Gastric ulcer	1
Weakness	1
Rheumatism	6
Fainting	1
Palpitation	1
Noises in the head	1
Spinal trouble	1
Local itching	1
Bad leg	4
Hernia in scar	3
Deafness	2
Bad eyes	3
Piles	3
Languor	1
Bad shoulder	1
Bedfast	1
Amputation left breast in 1914	1
Varix	1
Phthisis	1
Asthma	1
Dropsy	1

V. Conclusions.

The most striking feature in comparing the results of the two procedures is the fact that there is so little difference in the percentage of adverse symptoms after either type. One would expect to find the adverse symptoms of the artificial menopause very much more marked after the radical operation, and to find few, if any, after the conservative procedure. With regard to the question of flushings and the effect on the patient's sexual feelings, we certainly find a larger percentage suffering after the radical operation, and in a lesser degree the physical capabilities of patients seem better after the conservative than after the radical operation (question 3). The results of questions 4 and 6 regarding metabolism and the memory I alluded to earlier, and they require no further comment. The results of questions 2, 5, 8, 9, 10 and 11, with regard to general health, temperament, headache, indigestion, nervous symptoms and pain, are in each case favourable to the removal of both ovaries. In making a choice of the operation to be adopted, I think the most important questions to consider are the following:—

A. The after-effect on the general health.

B. The after-effect on the temperament.
C. The occurrence of flushings.
D. The occurrence of nervous symptoms.
E. The occurrence of pain.
F. The after-effects on the sexual feelings.

A. In my investigatons the general health was improved in a very large percentage of cases after either operation, but there was a distinct preponderance after the radical operation—91% to 84%.

B. The temperament of the patients after either operation does not seem to have been much affected, but a slightly higher percentage complained of irritability after the conservative than after the radical procedure in the proportion of 28% to 26%. This, again, is slightly in favour of the radical procedure.

C. We find a greater frequency of flushings after the radical than after the conservative operation. I form the following conclusions in this connection :—

Firstly, that whichever procedure be adopted, a very large percentage of the patients suffer from flushings and sweats afterwards for a certain period of time, that is, 91% and 73%.

Secondly, that a larger percentage of those who have both appendages removed suffer from flushes and sweats than those who have an ovary left, 91% against 73%; and conversely, a larger percentage of those who have an appendage preserved never suffer from flushes at all, 26% to 8.6%.

Thirdly, that with regard to the duration of the flushes after operation the percentage of those who suffered for a short period and then got rid of the symptoms is greater after the conservative than after radical operation.

What does surprise one is, not that 91% had flushes after the radical operation, but that 73% had them after the conservative operation. One would almost have expected to find that 73% had no flushes and 26% had flushes after the conservative operation, instead of the converse, as in my figures. The nature of the replies to this question did not give any indication of the relative severity of the flushes after the different types of operation. The conclusion one drew was that they were the same in either case. With regard to their duration the figures show that there was little difference except that after the conservative procedure a slightly larger percentage had them for a period under 12 months and then lost them, the proportion being 17% conservative to 12% radical cases. I have been unable to obtain exact information on the point, but I should imagine that, if these flushings are not simply due to the stoppage of menstruation, patients having one or both ovaries left would have a second manifestation of these menopause symptoms later on at the normal time for the change of life, while those who have had both

appendages removed would not be subjected to this. If such be the case, is one justified, for the sake of the slight majority who avoid flushings after the conservative operation, as shown in my figures, to subject the patient to the discomfort of a second menopause? It is interesting to note that in the replies to question 2, after the radical operation 91% patients enjoyed better general health and that after the same operation 91% suffered from flushings. This seems to indicate that the severity of the flushes is not a very serious matter.

D. My figures show that the removal of both appendages does not lead to nervous symptoms in a greater degree than when an ovary is left; but, on the contrary, a smaller percentage suffer in the proportion of 34% to 39%. In none of the cases did I find any insanity. This with the favourable replies as regards temperament seems to me to indicate that on this score one need have no qualms about performing the radical operation.

E. The question of pain following and persisting after operation must have great weight with the surgeon in deciding upon his procedure. In this connection the result of my investigation is distinctly in favour of the radical operation; .5% only of these cases remained the same as before, as compared with 2.2% conservative cases; 93% suffered less pain as compared with 82% conservative cases, and only 6% had more pain has compared with 15% conservative cases. Any factor which tends to increase the amount of cases suffering from pain after operation is a contra-indication to that operation, for no after-symptom is more wearing to the patient or troublesome to the surgeon than pain. One may say that, if pain persists, the operation has failed. Why should more patients suffer pain when the appendages have been left? It must be due to some of the changes which the radical gynæcologists say take place when appendages are left after hysterectomy, either from the ovary, deprived of its normal supports, prolapsing into the pouch of Douglas in an abnormal position, or undergoing degeneration, usually cystic, and forming adhesions to the surrounding parts and the intestines, thus causing pain. This greater frequency of pain following the conservative operation seems to me one of the strongest pleas for the radical operation.

F. Information about the effect of the removal of both ovaries on the sexual relationships of the patients is difficult to obtain as the subject is a delicate one. My findings show that these are more disturbed when both ovaries are removed than when some ovarian tissue is left, nearly 40% as compared with nearly 27%; 15% of these radical cases suffered from dyspareunia, chiefly due to narrowing of the vagina from atrophic changes. In many cases it was stated that

connexion was impossible from this cause, though in all the 40% of these cases there was loss of sexual desire. The patients did not seem worried by it. The important point is the effect on conjugal happiness. If this had been disturbed in my cases no mention was made of it. It would be a strong point against the radical operation in younger women. At the same time, it is noticeable that even after the conservative operation 17% lost their sexual desire, while we find 9% of the conservative cases suffering from dyspareunia compared with 15% of the radical cases; these figures are of course against the radical operation. How far this contra-indication outweighs the advantages of the radical operation would be a point to be decided by the patient and her husband beforehand.

My investigations then seem to have established the following points in comparing the conservative and radical operations.

1. The general health of nearly all the patients after both operations is much better, but a larger percentage are better after the radical operation.

2. The temperament of the patients is adversely affected in only a small percentage after either operation, but after the conservative procedure this percentage is slightly larger.

3. Flushings occur in a large percentage of patients after either operation. The percentage is greater, though not much, after the radical operation.

4. A very small percentage of patients complain of nervous symptoms after operation, but the percentage is larger after the conservative operation.

5. A very small percentage of cases after either operation complain of more pain, but after the conservative operation it is more than twice the percentage after the radical operation.

6. A larger percentage of cases have disturbances of their sexual relations after the radical than after the conservative operation in the proportion of 39% to 26.%,

7. There is a greater tendency to adiposity where both ovaries are removed.

In brief then one might fairly say that, so far as the majority of the manifestations of the artificial menopause are concerned, there is very little to choose between the two types of operation. The advantage lies with the radical operation in every way save two. The two exceptions are the occurrence of flushes and the sexual disability. The difference between the figures in the last two cases, as I have pointed out, is very slight. What we have to decide is, do the advantages of the radical procedure outweigh these disadvantages? The advantages of the radical procedure are that the operation is easier and quicker and therefore safer for the patient.

The final result is better, as there remains afterwards a smoothly peritonized pelvic floor with a linear scar running from side to side, and there is less risk of the formation of adhesions. Also the bleeding is more easily controlled than in the conservative operation. Most important of all, the possibility of the ovaries undergoing such pathological changes as to render necessary a second operation for their removal is done away with.

Owing to the fact that of late years it has been the practice at St. Mary's Hospital to remove both ovaries, I was only able to find a small number of cases in which ovaries had been preserved in cases of fibroid and chronic metritis. In this number, that is to say 45 cases, I found no case in which there had been further trouble with the retained appendages. Still, previously to this time I understand that members of the honorary staff had frequently encountered such return-cases, and chiefly based their present practice on this ground. I think my investigations go to prove that the patients do not suffer much more from the symptoms of the artificial menopause when both ovaries are removed than when one or both are retained.

In my comparisons I have been strictly fair, and although I must confess to a prejudice in favour of the radical operation, I have not allowed it to influence me. During the period of nearly nine years in which I have been at St. Mary's Hospital I can only call to mind one case attending the Out-patients' Department for symptoms of the artificial menopause.

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TABLE I.

SHOWING THE RESULTS AFTER THE DIFFERENT TYPES OF OPERATION.

Type.	Total cases.	Abdominal or Vaginal Total Hysterectomy plus both appendages.	Supra-vaginal Hysterectomy plus both appendages.	Total.	Vaginal Hysterectomy plus one appendage.	Supra-vaginal Hysterectomy plus one appendage.	Vaginal Hysterectomy	Total.
	231.	8 cases.	178 cases.	186.	2 cases.	3 cases.	40 cases.	45.
2. HEALTH								
Better		7— 87.5%	114—80.898%	81.322%	0— 0%	1— 33.3%	32—80 %	33—73.3%
Much better		0— 0 %	19—10.674%	10.674%	1— 50%	1— 33.3%	3— 7.5%	5—11.1%
Worse		1— 12.5%	11— 6.179%	6.451%	0— 0%	1— 33.3%	4—10 %	5—11.1%
Same		0— 0 %	4— 2.246%	2.246%	1— 50%	0— 0 %	1— 2.5%	2— 4.4%
3. WORK.								
More		2— 25 %	66—37.078%	36.559%	1— 50%	1— 33.3%	19—47.5%	21—46.6%
Less		4— 50 %	70—39.325%	39.794%	0— 0%	2— 66.6%	15—37.5%	17—37.7%
Same		2— 25 %	42—23.595%	23.655%	1— 50%	0— 0 %	6—15 %	7—15.5%
4. FAT.								
Fatter		5— 62.5%	111—62.359%	62.365%	0— 0%	2— 66.6%	18—45 %	20—44.4%
Thinner		1— 12.5%	17— 9.55 %	9.677%	0— 0%	0— 0 %	3— 7.5%	3— 6.6%
Same		2— 25 %	5—28.087%	27.956%	2—100%	1— 33.3%	19—47.5%	22—48.8%
5. TEMPERAMENT.								
Cheerful		3— 37.5%	89—50 %	49.462%	2—100%	2— 66.6%	14—35 %	18—40 %
Irritable		1— 12.5%	49—27.528%	26.881%	0— 0%	1— 33.3%	12—30 %	13—28.8%
Normal		4— 50 %	40—22.471%	23.655%	0— 0%	0— 0 %	14—35 %	14—31.1%
6. MEMORY.								
Better		0— 0 %	3— 1.685%	1.685%	1— 50%	1— 33.3%	0— 0 %	2— 4.4%
Worse		0— 0 %	49—27.528%	27.528%	0— 0%	0— 0 %	14—35 %	14—31.1%
Normal		8—100 %	126—70.786%	72.043%	1— 50%	2— 66.6%	26—65 %	29—64.4%
7. FLUSHES.								
Under 12 months		1— 12.5%	32—17.977%	17.741%	1— 50%	0— 0 %	15—37.5%	16—35.5%
Over 12 months		0— 0 %	16— 8.988%	8.988%	0— 0%	0— 0 %	2— 5 %	2— 4.4%
None		1— 12.5%	15— 7.865%	8.602%	0— 0%	2— 66.6%	10—25 %	12—26.6%
Still		6— 75 %	115—64.606%	65.053%	1— 50%	1— 33.3%	13—32.5%	15—33.3%

Still	6— 75 %	115—64.606%	65.053%	1— 50%	1— 33.3%	13—32.5%	15—33.3%

Type.	Total cases.	Abdominal or Vaginal Total Hysterectomy plus both appendages.	Supra-vaginal Hysterectomy plus both appendages.	Total.	Vaginal Hysterectomy plus one appendage.	Supra-vaginal Hysterectomy plus one appendage.	Vaginal Hysterectomy	Total.
	231.	8 cases.	178 cases.	186.	2 cases.	3 cases.	40 cases.	45.
8. HEADACHES.								
Under 12 months		1— 12.5%	21—11.797%	11.827%	0— 0%	1— 33.3%	3— 7.5%	4— 8.8%
Over 12 months		0— 0 %	6— 3.37 %	3.37 %	0— 0%	0— 0 %	1— 2.5%	1— 2.2%
None		4— 50 %	87—47.752%	48.924%	2—100%	2— 66.6%	14—35 %	18—40 %
Still		3— 37.5%	64—35.842%	36.021%	0— 0%	0— 0 %	22—55 %	22—48.8%
9. INDIGESTION.								
Under 12 months		0— 0 %	12— 6.741%	6.741%	0— 0%	1— 33.3%	2— 5 %	3— 6.6%
Over 12 months		0— 0 %	2— 1.123%	1.123%	0— 0%	0— 0 %	2— 5 %	2— 4.4%
None		7— 87.5%	125—70.224%	70.967%	2—100%	1— 33.3%	25—62.5%	28—62.2%
Still		1— 12.5%	39—21.91 %	21.505%	0— 0%	1— 33.3%	11—27.5%	12—26.6%
10. NERVOUS.								
Under 12 months		0— 0 %	16— 8.988%	8.988%	0— 0%	0— 0 %	7—17.5%	7—15.5%
Over 12 months		0— 0 %	6— 3.37 %	3.37 %	0— 0%	0— 0 %	0— 0 %	0— 0 %
None		6— 75 %	116—65.168%	65.591%	2—100%	2— 66.6%	23—57.5%	27—60 %
Still		2— 25 %	40—22.471%	22.59 %	0— 0%	1— 33.3%	10—25 %	11—24.4%
11. PAIN.								
More		0— 0 %	12— 6.741%	6.741%	0— 0%	0— 0 %	7—17.5%	7—15.5%
Less		8—100 %	165—92.696%	93.01 %	1—50%	3—100 %	33—82.5%	37—82.2%
Same		0— 0 %	1— .561%	.561%	1— 50%	0— 0 %	0— 0 %	1— 2.2%
12. SEXUAL.								
Normal		3— 37.5%	70—39.325%	39.247%	1— 50%	2— 66.6%	27—67.5%	30—66.6%
Loss of desire		2— 25 %	27—15.168%	15.591%	1— 50%	0— 0 %	6—15 %	7—15.5%
Dyspareunia		1— 12.5%	17— 9.55 %	9.677%	0— 0%	0— 0 %	4—10 %	4— 8.8%
Single		2— 25 %	60—33.685%	33.3 %	0— 0%	0— 0 %	0— 0 %	0— 0 %
Widow		0— 0 %	4— 2.246%	2.246%	0— 0%	1— 33.3%	3— 7.5%	4— 7.8%

TABLE II.

Showing the Results of the Radical and Conservative Operations.

Question & Answer. 231 cases.	Radical. 186.		Conservative 45.		Result. favourable to
2. HEALTH.					
Better	91.996%		84.4%		
Worse	6.451%		11.1%		Radical
Same	2.246%		4.4%		
3. WORK					
More	36.559%		46.6%		
Less	39.794%		37.7%		Conservative
Same	23.655%		15.5%		
4. FAT.					
Fatter	62.365%		44.4%		
Thinner	9.677%		6.6%		Conservative
Same	27.956%		48.8%		
5. TEMPERAMENT.					
Cheerful	49.462%		40.0%		
Irritable	26.881%		28.8%		Radical
Normal	23.655%		31.1%		
6. MEMORY.					
Better	1.685%		4.4%		
Worse	27.528%		31.1%		?
Normal	72.043%		64.4%		
7. FLUSHES.					
Had flushes	91.782%		73.2%		Conservative
No flushes	8.602%		26.6%		
8. HEADACHES.					
Yes	51.218%		59.8%		Radical
No	48.924%		40.0%		
9. INDIGESTION.					
Yes.	29.369%		37.6%		Radical
No.	70.967%		62.2		
10. NERVOUS.					
Yes	34.948%		39.9%		Radical
No	65.591%		60.0%		
11. PAIN					
More	6.741%		15.5%		
Less	93.01%		82.2%		Radical
Same	.561%		2.2%		
12 SEXUAL.					
Normal	60.833%		73.17%		
Loss of desire	24.166%	39.166%	17.07%	26.82%	Conservative
Dyspareunia	15.000%		9.75%		

A Case of Iniencephaly without Spina Bifida.

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THE relative infrequency, indeed the great rarity of this fœtal abnormality justifies the publication of this case. Saint-Hilaire has referred to this great rarity, and Ballantyne, although he doubts the extreme infrequence of incidence, has reported only 7 cases.[1]

Apart from its rarity the specimen which I describe presents some features abnormal even in this abnormality and, moreover, one of the features which Ballantyne has described as characteristic, namely, spina bifida, is completely absent.

The specimen was one of a series of still births (now over 150 in number) which I am investigating on behalf of the Medical Research Council.

The mother was 26 years of age and had previously, in 1915 and 1919, given birth to two healthy full-time children now alive. Apart from being prolonged the labour, which lasted 62 hours, was normal, while the fœtal heart, beating at 120 per minute, was heard on admission to King Edward VII Hospital, Cardiff, and in the early part of labour, although at birth the fœtus was dead.

On examination the fœtus presented the appearance characteristic of this deformity as shown in Fig. 1. The head was large and globular and retroflexed on the spine so that the face looked distinctly upwards as well as forwards: the various cranial diameters measured as follows:—sub-occipito-bregmatic 11.5 cm., occipito mental 12.0 cm., occipito frontal 11.0 cm., and interparietal 8.0 cm. The scalp was loose and the skull bones very mobile on each other. The front of the neck was occupied by a large mass of fat resembling, at first glance, a goitre: the ears were normally formed and there was no trace of maceration. The sex was female, as is common in these deformities; it weighed 2140.36 grms. and measured from scalp to heel 39.50 cm.

1. Ballantyne, J. W., *Antenatal Pathology and Hygiene* (Edinburgh, 1904).

On opening the abdomen, chest and neck in the mid-line a thick layer of subcutaneous fat was everywhere evident, being especially marked, as stated, on the front of the neck and also over the upper part of the sternum: it was typical fœtal fat, being cut up by fibrous tissue septa into very fine lobules. The liver was prominent and reached down to the level of the umbilicus. On dislodging the liver the left cupola of the diaphragm was seen to be entirely absent in its dorsi-lateral part, the ventri-lateral part being represented by a small muscular band attached to the costal margin in front and with a free posterior edge. The left hepatic lobe occupied the space to the left of the heart normally occupied by the left lung.

On removing the liver it was seen to be of a doubled-up shape from side to side, the groove for the ductus venosus being converted into a canal by fusion of hepatic tissue underneath. Some small intestine (7.5 cm.) was firmly adherent to the cystic duct and had to be removed along with the liver.

The left kidney and suprarenal body were seen extending up the posterior wall of the thorax, the tip of the suprarenal body lying at the level of the seventh rib, while above this was seen the spleen.

Between these structures and the heart was the left lung, a small fleshy structure 3 cm. in vertical measurement attached to the left side of the pericardium. The right lung was also small, firm and fleshy, but larger than the left, being 5.2 cm. long. The thymus was large and pale and hung down one-third of the way in front of the pericardium, while the thyroid was normally situated and presented no naked-eye abnormality.

The stomach consisted of a vertical *cul-de-sac*, the wall of which was pale and showed some sacculation: the apertures of entry and exit were both at the upper end only about 1 cm. apart, while the sac measured vertically 6.0 cm. The organ lay partly behind the heart and partly behind the liver, and was surrounded by a large and soft pancreas. The small intestine, 41.0 cm. in length, lay partly behind the pericardium and partly arranged in an irregular fashion in the abdomen, ending in the left iliac fossa where the appendix, 3.20 cm. long, was seen: the ileo-cæcal junction was represented by an ampulla-like swelling from which the large gut, 21.0 cm. long, extended in an irregularly double sigmoid fashion to turn down into the pelvis to join the rectum, which was 5,20 cm. long and opened at the anus. The intestinal canal was everywhere patent, but there was no difference in calibre between the small and large gut, the latter showing no attempt at arrangement into ascending, transverse and descending colon.

The kidneys were both lobulated: the right one was normally placed while the position of the left one has been described. In both cases the suprarenal body was present but small.

The heart showed a normal right auricle and ventricle: the left auricle was represented by the merest appendage-like structure which communicated with the right auricle normally by the foramen ovale, but the left auriculo-ventricular opening was very small and required very careful searching for.

All the serous membranes were very firm and thick showing a great tendency to contraction and adhesion formation: the mesenteric bands were much contracted while there was everywhere a tendency to the formation of adhesions between adjacent coils of bowel. By transmitted light a beautiful demonstration of the lymphatics in the mesenteries was obtained.

The weights of the various organs were as follows:—Liver, 81.50 grm.; spleen, 2.90 grm., the edges of which were rounded and notching was absent; lungs, right, 3.67 grm., left, 1.50 grm, both sank in water; suprarenals, right, 1.04 grm., left, 1.25 grm.; kidneys, right, 6.47 grm., left, 6.50 grm.; heart, 7.85 grm.; thymus, 4.56 grm; thyroid, 9.9 grm.; pancreas, 2.50 grm. It will be seen that in each case the organs weighed less, and in some cases much less, than the normal for full development.[1]

Sections from all the organs were examined microscopically. Beyond a certain tendency to interparenchymatous fibrosis no observable lesion was found to be present.

A sagittal mesial section was made in order to investigate the condition of the spinal column. In the cervical region some fusion of vertebræ was present, and at this point an acute retroflexion of the column had taken place so that the base of the skull was directed not only upwards but also backwards. Examination of the whole column did not reveal any posterior defect and there was no tendency to spina bifida, even in the cervical region where, as stated, some fusion of vertebræ had occurred. The spinal cord enclosed in its membranes lay normally in the vertebral canal. The foramen magnum was distinctly more capacious than normal, being 2.50 cm. in diameter, the normal being about 1.00 cm. The brain weighed 255.13 grms.; it was very fluid and ran out so that it could be investigated only with considerable difficulty, but there was no sign of cerebral or meningeal hæmorrhage. An ossific centre was present in the lower femoral epiphysis, showing that the fœtus had reached the ninth month of development. The placenta was adherent and required manual removal; it weighed 382.69 grm., and was of ragged appearance and irregular shape, with here and there a fragment absent. On section it was uniformly soft, but neither on the surface nor in the interior was

1. See Vierordt's figures quoted by Thomson and Wakeley, *Journ. Obstet. and Gyn. Brit. Emp.*, Summer No. 1921.

ing the iniencephalic fœtus in profile.

Fig. 2. The same as Fig. 1. after sagittal section has been performed. It is seen that there is no posterior spina effect.

any hæmorrhage or infarction detected. The umbilical cord measured 40.50 cm. and was of normal appearance.

Remarks.

The rarity of the condition, the diaphragmatic and multiple visceral irregularities, combined with the absence of any sign of spina bifida, are features that make this case worthy of record.

Ballantyne lays down three cardinal characteristics of iniencephaly, viz., imperfect formation of the occiput in the neighbourhood of the foramen magnum, spina bifida of considerable extent, and backward bending of the spine. The first and last of these were well marked in this specimen, while the second, as stated, was completely absent, and the main interest of this specimen, apart from the rarity of the condition at all, lies in the fact of the complete absence of spina bifida.

Again, while the occiput was defective in the region of the foramen magnum, causing the increased diameter of that aperture to be produced, it is to be noted that there was no evidence there of any protrusion of cerebellar matter.

Placental adhesion is common both in iniencephaly and in anencephaly.

Regarding causation, the accepted view appears to be that the condition is brought about by amniotic pressure exerted on the fœtal head as early as the third week of embryonic life when the normal fœtal position is one of spinal extension; this pressure would prevent the undoing of the extension which normally occurs by the fourth week, the head becoming fixed and developing in this extended position.

The photographs and the X-ray print which are appended will, I hope, help to illustrate the description in the text.

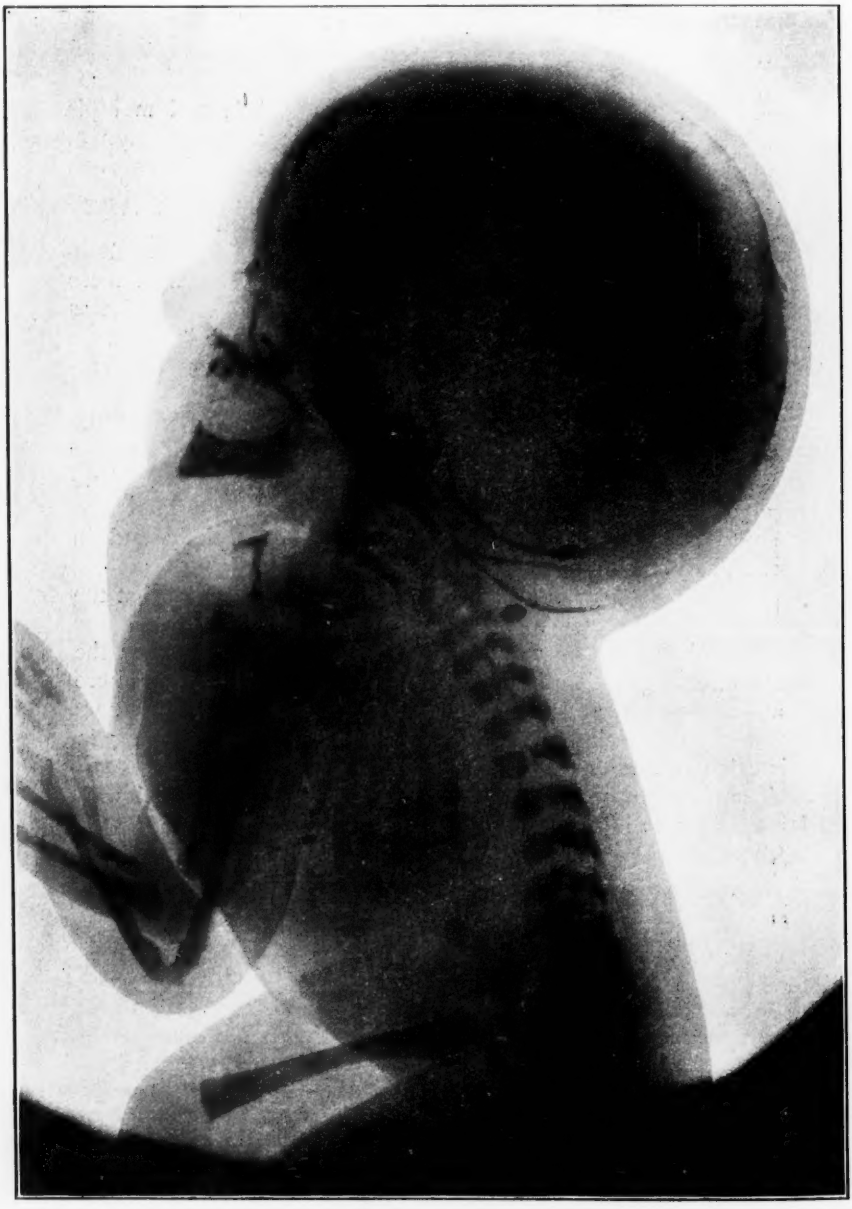

Fig. 3. A print of an X-ray photograph of the iniencephalic fœtus; note the spinal fusion in the cervical region also the completeness of the posterior spinal processes with absence of spina bifida.

Salpingotomy versus Salpingectomy in the Treatment o Tubal Gestation.[1]

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In 1914, at a combined meeting of the North of England, Edinburgh, and Midland Obstetrical and Gynæcological Societies, a paper was read by my colleague, Professor Thomas Wilson, and myself, in which we reported the results of an investigation into the pathology of tubal gestation, based upon the dissection of 30 fresh and unhardened specimens of tubal mole, abortion, and rupture. This paper, for various reasons—the chief being the incidence of the European War—was never published. As the present communication is somewhat in the nature of a corollary to the same, it is necessary to refer briefly to the chief points resulting from that work.

We found, on dissecting under fluid a freshly removed Fallopian tube containing a tubal mole, that it was possible in all cases to trace the lumen of the tube around and beyond the mole; in fact, as far as it was required to carry the dissection. Further, the mole itself was always attached by a narrow base or pedicle to some part of the tubal mucosa. This area never exceeded ½″ in diameter, and we regarded it as the site of original implantation of the ovum (Fig. 1). In dissecting such a pregnant tube it was, moreover, always easy to elevate the mucosa from the surface of the gestation until this spot was reached. Here it was firmly adherent, and, if force was exerted, either fracture of the clot, or laceration of the tubal wall occurred. The former was by far the more common.

We also found it possible in the majority of cases to trace the tubal mucosa as a collar or sheath over the surface of the attached base of the mole for a distance of a few millimetres. This was verified by sagittal and coronal sections taken through the attached base, and proved that rupture of the ovum had occurred from its embedded position in the tubal wall, through the mucosa. The shape of a dissected mole, if of any size, was ovoid or finger-like, the contour being undoubtedly the result of pressure of the walls

1. Read at the Royal Society of Medicine (Section of Obstetrics and Gynæcology), January, 1922.

upon the coagulated maternal blood whilst the latter was still of malleable consistence. That the wall of the tube does exert considerable pressure upon a mole was shown by the longitudinal furrows upon the surface of the clot, corresponding to the rugæ of the tubal mucosa (Fig. 2). In the case of small moles, in which the extravasated blood was small in amount, the shape tended to be more globoid, as indicated in Fig. 3. The surface of all the dissected moles was quite devoid of epithelium, with the exception of the narrow attached base shown in Fig. 1. Tubal abortion appeared to be produced by peristaltic action of the Fallopian tube, sufficient to sever the attachment of a mole to the mucosa. We concluded from our investigations that sudden and complete rupture and detachment of the ovum into the lumen of the tube, and its *immediate* abortion rarely if ever takes place. The original separation is only partial, the mucosal laceration being followed by extravasation of blood between chorion and tube-wall, a mole resulting; this is expelled at a later date by rupture of the narrow attachment, initiated by peristaltic action of the tube probably stimulated by the presence of the foreign body. When abortion was complete we found that if the recently pregnant tube was dissected at once, it was possible still to ascertain the site of original implantation of the ovum. It appeared as a small area about $\frac{1}{4}''$ in diameter, marked by a clot.

A factor of considerable importance, both in connexion with the shape of a tubal mole and also in dominating the mode of termination of the gestation, is that of tissue resistance. The anatomical conformation of the Fallopian tube in its distal two-thirds is such that the direction of least resistance is away from the uterus and towards the ostium abdominale. Furthermore, the floor of the tube is supported to a considerable extent by the cellular tissue of the meso-salpinx. Rupture of a gestation situated upon the floor of the tube appears more likely, therefore, to take place into the lumen than into the meso-salpinx. This coincides with our clinical experience, for in all the investigated cases of tubal mole and tubal abortion, the site of implantation had been the floor of the tube. Further, in all cases of implantation of the ovum upon the floor of the tube, with but one exception, tubal mole or abortion occurred. When intra-tubal rupture occurs, the blood, as may be expected, takes the direction of least resistance and flows towards the ostium. This was proved in our specimens by the fact that the attachment of the mole was *in all cases* at its proximal pole.

Should the ovum reach the narrow isthmic part of the tube and embed itself in this situation, the wall may become so thinned by syncytial erosion that the direction of least resistance is centrifugal

through the peritoneal coat, rather than centripetal, and towards the ampullary lumen. In such a case rupture of course occurs.

The conclusions, therefore, which we reached in 1914, and which I have confirmed on many subsequent occasions, may be summarized as follows:—

1. Tubal mole is the direct result of intra-tubal rupture, and the mole invariably retains a *very narrow basis of attachment* to the tubal wall.

2. The attached base is usually situated on the floor of the tube and is always at the proximal end of the mole.

3. When tubal abortion takes place, the pedicle of a mole is torn through by the peristaltic action of the tube endeavouring to expel the foreign body.

4. Clots may be expelled from the tube through the ostium abdominale without separation of the mole occurring. Such clots are frequently ovoid in shape.

5. The conformation of a tubal mole or tubal abortion is the result of pressure of the tubal wall upon the clot, the impression of the normal rugæ being frequently observed.

6. The surface of the pedicle of a mole usually presents traces of tubal mucosa. Such epithelium is not present at the distant pole.

7. The deciding factor as to whether intra- or extra-tubal rupture shall occur, is the direct outcome of the combination of tissue erosion and tissue tension. This is influenced by the site of implantation of the ovum in the ampullary, isthmic, or interstitial portions of the tube.

8. Evidence, either macroscopic or microscopic, of pre-existing inflammation of the tubal wall appears to be the exception rather than the rule in cases of tubal mole and abortion.

The two points upon which I would lay special emphasis are, first, the existence of a pedicle or narrow basis of attachment in all cases of mole, and, secondly, the ease with which the rest of the mole can, in the case of *fresh* specimens, be detached from the tubal mucosa. These two points suggested to me the possibility of removing a mole from the tube *in situ*, and raised the question as to *whether we are justified in sacrificing the tube on all occasions.*

In a small series of ten cases, therefore, previous to removing the tube, I performed salpingotomy and extracted the gestation. The mole was excised without difficulty and hæmorrhage either from the pedicle or the tubal wall was easily controlled by suture. The tube in these ten cases was then removed and examined in detail for evidence of inflammatory change. In all the specimens the tissues appeared to be normal, and the abnormal implantation of the gestation to be purely accidental in origin.

There seemed, therefore, to be quite a good case for salpingotomy, and on five occasions during 1921 I adopted this method in the treatment of tubal gestation. Three of the patients were cases of tubal mole, one a case of partial tubal abortion, and one a case of fulminating rupture. On each occasion the operation was performed without any great technical difficulty, and all the patients made a normal and uninterrupted recovery. Catgut was employed as the suture material, a round-bodied intestinal needle being used. No difficulty was experienced in maintaining the lumen of the tube owing to its dilated condition. Care was required, however, to avoid laceration and unnecessary damage to the tubal wall owing to the softened condition of the tissues.

Hæmorrhage did not create a difficulty, although in the case of tubal rupture of a $2\frac{1}{2}$ months' gestation, the precaution was taken of ligaturing the ovarian vessels previous to suture of the tube.

With regard to the place of salpingotomy in dealing with cases of tubal rupture, probably salpingectomy is the better procedure. In the presence of severe hæmorrhage life is more important than conservatism, and the interests of the patient are possibly better served by excising rather than suturing a badly lacerated tube.

In the case, however, of tubal mole and tubal abortion, salpingotomy appears to be worthy of a trial as offering an alternative method of treatment. Time, of course, must prove whether the adoption of such a procedure is followed by other complications such as recurrence of the accident (for pure accident I believe it to be in the majority of cases), the subsequent development of hydrosalpynx, or, perchance, the incidence of a tubal chorion-epithelioma.

The Treatment of Advanced Carcinoma of the Cervix of the Uterus by Radium.*

By Arthur Burrows, M.D., B.S. (Lond.), F.R.C.S. (Eng.),
Radiologist, Manchester and District Radium Institution, Royal Infirmary, Manchester.

This paper deals with the treatment of advanced uterine carcinoma by radium, and I do not propose to discuss the treatment of early carcinoma of the cervix of the uterus. Until within the last two years all cases which I have treated have been beyond operation, consequently any figures that I may give cannot fairly be compared with statistics showing the success or otherwise of Wertheim's hysterectomy. Every single case of apparently hopeless malignant disease saved or rendered operable by radium is a subject of rejoicing and hope, and much solid satisfaction can be obtained by contemplating the large number of patients whose symptoms are made negligible for months or even years. Radium has not, so far, solved the problem of dealing effectually with the secondary deposits, although recent research shows possibilities in that direction, but of its great value in the treatment of carcinoma of the cervix of the uterus there is no doubt.

In the early days of radium treatment Wickham and those associated with him first treated cancer of the cervix by placing, for varying times, heavily screened radium applicators against the growth. They reported considerable success, but later the insertion of a strong radium tube into the cervical canal proved more beneficial. Still more recently the practice of burying a number of radium or radium emanation tubes in the cervical growth and the tissues round about it which are actually invaded or liable to be so, has improved results still further.

At the present time I adopt one of two methods, and even after more than a year of comparison have not been able to make up my mind which is the better. There is no necessity for the heavy metal screening which has been employed by radiologists, but still the choice lies between a screened and an unscreened method of treatment. In no case need a screen thicker than 1 mm. of silver be employed, unless the huge doses (not available to most of us) used at Baltimore are to be considered.

1. Paper read at the Annual Meeting of the British Medical Association at Newcastle-on-Tyne, 1921.

In the screen method at Manchester about seven tubes are inserted under an anæsthetic. A large one of about 50 millicuries of emanation (that is, 50 mg. of radium element) screened by 1 mm. of silver is introduced well up the cervical canal. Six other smaller tubes screened by 0.3 mm. of brass (previously platinum) are pushed into or about the cervical growth, care being taken to introduce two or three into the broad ligaments. The strength of each of these smaller tubes is about 15 millicuries. If consistently good results are to be obtained, a dose of never less than 120 millicuries for twenty-four hours must be given.

In employing the unscreened method I still use the large central tube mentioned above, but insert in the surrounding tissues small unscreened capillary glass tubes, each containing radium emanation of a strength of 2 to 5 and even occasionally 7 millicuries. They are inserted to the number of two to eight by means of an exploring syringe needle and stilette. No effort is made to withdraw the small tubes, but the large one is removed after twenty-four hours.

So far I think I may say that with practice and strict cleanliness there is no immediate danger in either method. In each case the vagina is packed with gauze after the insertion in order to maintain the tubes in position. Occasionally this packing produces retention of urine, and catheterization is necessary.

Douching should be performed daily after the operation—firstly and important, to keep as clean as possible the reacting growth, and secondly, though not now so important since tubes have been buried and not merely placed in the vagina, to prevent the formation of vaginal adhesions.

There still appears to be considerable possible variations in the quantity of radium employed, its time of application, and the screening used—so much so that reports of successful cases, now coming from all over the world, often make one pause and think.

Cases for Treatment and Prospects.

In the treatment of inoperable malignant disease there is not a great deal of choice. The vast majority of those patients who come as hospital cases for examination with a view to radium treatment are put down for radium. But even for radium a few cases are worse than hopeless; they come with large secondary masses in the liver and abdomen; paralysed legs from deposits in the spine and the pressure of glands; while, locally, the large cloacal fistulous openings sometimes seen only remind one that all the troubles of patients dying from malignant disease should not be put down to radium. Such extremely advanced cases should be left alone, but they do not form more than 5 per cent. of those seen.

When cases are not so bad the outlook is not good when (1) The

growth is very large and hard. With adequate treatment it tends to slough: with inadequate treatment nothing happens to the patient's advantage. Large fungating growths do not matter—curettage may spare somewhat the small quantities of radium at our disposal, but I have not otherwise found it necessary. (2) Cases with very extensive infiltration of the vaginal wall rarely give a good result, even from the point of view of palliation. (3) I have yet to be convinced that the exact histology of the carcinoma is much help in the prognosis of cases, but those tumours which rapidly form metastases give the worst results, and it is probably for that reason that the outlook in women under 40 is bad whatever the stage of the disease, while the prognosis improves as the menopause is approached or passed.

For the best results cases just beyond operability, as might be expected, are the best, but the presence of some slight mobility of the uterus, a good blood supply to the tumour, and the absence of secondary growths, are all factors of good omen.

The more firmly the growth is adherent to the bladder and the greater the infiltration of the bladder wall and urethra, the more chance is there of a fistula resulting from the treatment; but the percentage is low (in fact, very little above that of untreated cases), and adhesion to the bladder by no means renders the case hopeless. I find that a recto-vaginal fistula is quite uncommon.

In estimating the immediate results of radium treatment, with an eye to the future progress of a case, a very high standard must be set. The patient in a so-called "symptomatic cure" should profess to feel perfectly well and to be absolutely free from pain or discharge. Examination should show the uterus to be quite mobile, while the cervix should be small, smooth, and any scar tissue soft and supple. Vague pain in the abdomen, back, or limbs, slight induration in the vault of the vagina, enlargement and hardness of the cervix, are all factors which promise recurrence.

It is interesting, however, to note that sometimes recurrence may not be manifest until as long a period as two years has elapsed.

Pathological Notes.

During the last two or three years, owing to the interest and help of the Manchester gynæcologists, I have been able to obtain microscopical examinations of a number of cases of carcinoma of the cervix which have been treated first by radium, the uterus being removed six to twelve weeks later. It is interesting to note that in most of the cases the growth in the cervix has completely disappeared and been replaced by the characteristic dense radiation connective tissue. Occasionally a few degenerate malignant cells are seen. One of my patients who was killed in an accident six

months after treatment, showed no sign at all of growth at the post-mortem examination. From this it would seem that, at least locally, radium can be and often is effective in its destruction of a cancer.

Statistics.

I propose to deal only with some figures from my own cases. All the cases dealt with in detail here were inoperable, and presumably surgical interference would have been useless. For further figures on the subject as a whole I must refer you to Dr. Janeway's valuable paper published in *Surgery, Gynæcology, and Obstetrics*, September 1919.

In 1915 I found that 10 per cent. of my cases of cancer of the cervix of the uterus showed no sign of disease at the end of the year. This figure has gradually improved with better technique, and, in spite of an increasing number of patients, has risen to nearly 30 per cent.

I have analysed in more detail the 100 cases I treated between April 1916, and July 1918. I have not gone earlier because I was then using only a single tube, but in 1916 I began increasing the dosage and the number of tubes employed. The figures, therefore, are taken as far back as possible in the early stages of more adequate dosage. The cases were treated between three and five years ago. Prior to that period I have been able to trace two cases which have been alive and well for over five years.

The hundred cases are divided as follows, and those who have tried to trace patients in numbers will bear with me in the deficiencies of the list :—

6 are definitely well to-day and have been well from three to four and a half years (1 three, 2 three and a half, 1 four, and 2 four and a half years).

5 were well twelve months after treatment, but I have failed to trace them since.

7 were well three to six months after treatment, but have not since returned.

6 were rendered operable and operation performed.

32 were made quite comfortable and able to work from six months to two years. Some of these have died subsequently.

26 were not improved or died quickly.

16 cases I could get no information about at all.

2 were given prophylactic irradiation.

This gives 6 per cent. who have definitely lived up to the present time and been well for a period of three to four and a half years.

During the period analysed the number of cases traced to be apparently well at the end of the year was about 15 per cent. It is now nearly 30 per cent., so it seems at least probable that 12 per cent. of the inoperable cases of carcinoma of the cervix treated by radium at the present time will be alive and well in three to four and a half years' time. When to this 12 per cent. are added those cases which become operable and those which remain well for a considerable time and disappear, the record is, considering the present state of the therapeutics of cancer, a hopeful one.

But, apart from all the above facts, the radium treatment of cancer of the cervix is well worth while for its wonderful powers of palliation alone.

DISCUSSION.

Dr. W. Robinson (Sunderland) thought that if 12 per cent. of Dr. Burrows's patients with cancer of the cervix were alive and well three to four years after his treatment, much better results might be obtained if the same treatment were to be applied to early cases. He was not satisfied with the results of the radical cure of cancer of the cervix by panhysterectomy with removal of the pelvic glands. The operative mortality was still excessive, even in the most skilled hands, and serious complications (urinary fistula, etc.) frequently followed the operation. In the hands of some surgeons the pelvic tissues and glands were not removed *en masse* nor as completely as they should be, owing to the difficulty of the operation. As in only 30 per cent. of those dying from the disease were the lymphatic glands infected with cancer—the disease spreading generally by continuity of tissue and not by permeation—it was reasonable to expect eradication or destruction of the disease by a less extensive procedure, if the cases could be operated upon in an early stage; he had, in fact, several such patients, alive and well, from whom he had removed a cancerous uterus many years ago by the vaginal method. Byrne's treatment by the actual cautery had been at least as successful as the knife, and his operative mortality was *nil*. Cancer cells were more easily destroyed by heat than normal cells, hence they were killed at a greater depth than the surface of the tissues to which the cautery had been applied. Byrne's figures gave hope of better results (less risk than by extensive dissection) by the local application of radium, whose penetrating effects were greater than heat. One difficulty might be so to apply the needle-like containers as to make sure of destroying any deeper affected parts which were hidden from view.

Dr. H. E. Gamlen (Newcastle). As malignant disease of the uterus generally ended in death, it was his opinion that the only

way to combat it was to discard most limitations and make a bold bid for its eradication by means of huge doses of radium. For many years he had been acquiring experience in the use of radium, but only within the last eighteen months had he been possessed of a sufficiently large quantity to be of use in treating malignant diseases seriously. He was now working with 300 mg. of radium bromide or its equivalent. Most of his work in the treatment of malignant diseases of the uterus had been done under the supervision of an eminent gynæcologist, and a certain amount of success had been recorded. In some cases it was surprising how large growths of the os and cervix melted away after a few days' intensive treatment. Further success was obtained by the introduction of large doses of radium into the body of the uterus. Some of these cases for the time being appeared to be clinical cures, as no traces of the growth had been found. Quite recently some very fine radium needles had been acquired, and by their introduction into growths and surrounding tissues he felt optimistic of obtaining still better results.

Mr. W. Ernest Miles (London) said that at the Cancer Hospital he had many opportunities of observing the treatment of inoperable cancer of the cervix by radium, and had yet to see the case that had been cured by that means. Dr. Burrows said that the most favourable cases for radium treatment were those that were just inoperable. He would like to ask how that point was determined. In his experience it was often extremely difficult in borderland cases to say whether an operation was possible or not unless abdominal exploration had been carried out. It often happened that a growth, though apparently in an early phase and freely movable, was found, on opening the abdomen, to have given rise to widespread glandular and peritoneal involvement rendering operative interference impossible. Conversely, many growths, though seemingly fixed, were found, on intra-abdominal inspection, to be amenable to panhysterectomy. On several occasions he had been able to carry out a radical operation in apparently inoperable cases, and as a consequence the patients were alive and well to-day. It would seem, therefore, to be a pity to subject such borderland cases to radium treatment without having previously determined their inoperability by abdominal section. His experience of radium treatment had been that whereas in some instances a certain amount of regression might take place in the primary growth, the metastatic deposits were so stimulated to activity that rapid and widespread dissemination occurred.

Mr. Cecil Rowntree (London) said that the results described by Dr. Burrows were very striking, and compared most favourably with those of panhysterectomy; indeed, they almost approached

those claimed by Erlangen himself. It was evident that his methods must be very different from those employed at the Cancer Hospital, for, in spite of the fact that they had, for a long time past, had quite a large supply of radium at their disposal, yet the results obtained had been bitterly disappointing; his experience, and that of his colleagues also, had shown that although temporary improvement sometimes occurred, yet this improvement was never maintained, and that in carcinoma of the cervix, as in all other forms of carcinoma with the exception of rodent ulcer, recrudescence of the disease invariably showed itself.

Mr. Beckwith Whitehouse (Birmingham) asked Dr. Burrows if he had had any immediate ill-effects from the use of radium in large doses when applied to the cervix. In the experience of some, enteritis and colitis were not uncommon sequelæ, and at least one fatal case had been recorded in a Continental medical journal.

Dr. Ranken Lyle, after thanking Dr. Arthur Burrows for his valuable paper, said that his own experience of the treatment of such cases by radium was very small. In association with Dr. Gamlen he had used it in about ten or twelve cases; in some the disease rapidly disappeared as if by a charm, but unfortunately returned in all cases except one, which so far appeared to be still quite free from the disease. The results that Dr. Burrows had obtained from the use of radium were exceptionally good and encouraging; those who had not so far obtained better results from this treatment should not be disheartened, because every inoperable case cured by radium was a positive triumph, and it was quite possible that before long the results from this treatment would improve as experience in its use grew.

CLINICAL REPORTS.

On a case diagnosed as Fulminant Menstrual Peritonitis: A contribution to the study of Idiopathic Puerperal Fever (self-infective).

By J. George Adami, C.B.E., M.D., F.R.S.,
Vice-Chancellor, University of Liverpool.

With respect to the existence and mode of causation of idiopathic, sporadic puerperal fever, a case that came under my care as pathologist some years ago may not be without value. I did not publish it at the time, as it was a private and not a hospital case, and, what is more, concerned the family of a colleague and friend. Unfortunately, as a private case, I did not make the full detailed notes which I possess of all my hospital cases. But the details impressed themselves upon me with such peculiar vividness that I am sure the statements in this note are correct.

I was called up on the telephone one evening by my colleague, Professor M——, since deceased, who held a chair in one of the non-medical faculties of McGill University. He was in great distress. One of his daughters—I think the eldest—had just died after an illness of such brief duration that the physician who had been called in refused to sign the death certificate save on condition that a post-mortem were held to determine the cause of death. The girl, indeed, had been in robust health until the very day of her death. She came of a healthy family unaccustomed to call in the doctor, so much so that they had no regular family practitioner, nor had the mother regarded the condition as other than a transient disturbance until the afternoon, and then, when a doctor was summoned, he was not able to attend until the girl was comatose and beyond his help.

Professor M.'s house was but a few minutes' distance from my own and from the hospital, and I was able to perform the autopsy without delay, in fact within two hours after death, and to make the bacteriological diagnosis in my laboratory at the hospital that same night. What impressed the case so vividly upon my memory was this: that in my experience as a hospital pathologist—and as such I had performed, or superintended the performance of, hundreds of

autopsies—I had never, save in the case of infants and young children, performed a post-mortem upon a body that did not in one organ or other show some evidence of previous disease. Here on the contrary, was a body absolutely without blemish—that of a tall, well-developed, well-proportioned and indeed beautiful girl, just entering upon womanhood. So perfect, that for once, as a pathologist, I felt it almost a sacrilege to touch, let alone to mar it by the necessary incision. There was no external mark of violence, the body was still warm, lividity not noticeable and rigor mortis incomplete. The organs of the neck and chest were apparently perfect; there was not even a thread of pleural adhesion nor any increase in pleural fluid. The heart and large arteries were normal. I cannot recall any appearance of cloudy swelling. Doubtless the artificial light made this, if present, difficult to detect. The same applied also to the other organs. One unusual condition, however, presented itself when the abdomen was opened, namely, the intestines were wetter than usual and diffusely injected, and there was a very definite accumulation of fluid in the pelvic cavity, where also the intestinal coils and the Fallopian tubes were more intensely injected. But the fluid was not purulent; it was still translucent, though at the same time definitely turbid.

It was my constant custom not to employ platinum loops for making cultures, but instead sterilized Pasteur pipettes made out of glass tubing, and I collected two or three samples of this abdominal fluid in the pipettes besides making the routine pipette collections from the heart blood, liver, spleen and kidneys. The congestion and increased quantity of fluid indicated that here was a peritonitis of an acute type that had not gone on to suppuration. To find the source of this peritonitis I, in the first place, examined the peritoneal surfaces without finding any focus of greater inflammation or ulceration. Next, I removed the small and large intestines, washed them out and opened them without discovering any lesion of the mucosa from the jejunum to the lower end of the rectum; the mucosa throughout was normal. The same was true of the stomach and the duodenum. Liver, spleen, pancreas, kidneys and adrenals were all perfectly normal, without a blemish (this with the proviso already mentioned, that their examination was conducted under artificial light). The state of the mesenteric glands I cannot recall. As a matter of routine I must have examined them, but the result has left no impression.

I had been told that the girl was menstruating at the time of her death, therefore I made a special study of the genitalia. The uterus was firm, of normal size, its mucosa reddened, and it contained blood-stained fluid. There was, however, no appearance not compatible with simple menstruation. I remember making

particular note of the absence of any mucous plug closing the cervix, which absence is characteristic during menstruation.

The Fallopian tubes were injected, as already stated, and the fimbriæ abnormally 'angry' in appearance. These, like all other parts of the body, were in normal position. The ovaries again were of good size and normal. I remember looking for and finding the site of the recently dehisced Graaffian follicle, but forget on which side I found it. The brain I did not examine. The symptoms from the first had been abdominal and the discovery of acute peritonitis gave, I held, an adequate cause of death, rendering examination of the nervous system unnecessary, save as a last resort should my cultures be negative.

All that I could determine, therefore, was an acute generalized peritonitis with evidence of greatest intensity in the pelvic region, with no primary lesion in the alimentary tract or respiratory organs, and, with this, active menstruation.

I took the Pasteur pipettes to my laboratory at the Royal Victoria Hospital, and there I made immediate smears from the peritoneal fluid, only to discover a remarkable state of affairs. The fluid contained very few cells, but was to all intents and purposes a pure culture of a streptococcus in long chains; each chain constituted of scores of cocci, with here and there tangled masses of chains. It was these streptococci, rather than the cells, that were the cause of the turbidity of the fluid. The only explanation of such a state of affairs was one which tallied with the clinical history, namely, the growth in the peritoneal cavity of a streptococcus of such intense virulence that it caused a negative instead of a positive chemiotaxis, and set up a serous in place of a purulent exudate. The signs of inflammation being most intense in the pelvic cavity, coupled with the rapidity of the development of the fatal event, indicated, forcibly, that the entry of the streptococcus must have taken place somewhere in the pelvis.

This was the history that was given to me:—

The girl, aged fourteen years of age, close upon fifteen, had always been splendidly healthy and vigorous, delighting in outdoor life, and at school—a large and popular girls' school in Montreal—she had been a leader in athletics, and was captain of the school gymnastic team. She had been comparatively late in menstruating, in fact, her second period came on only three days before her death. It came on two days before the annual school Gymnastic Exhibition and competition, to which parents and friends were invited. In her keenness, the girl persuaded her mother to let her take part in the display; the girl was in good health, suffered no pain and the flow had been but slight. Against her better judgement the mother gave her consent. The girl took part in the successive

events with distinction and without any sign of discomfort. Incidentally, enquiring what exercises she went through, I was told by the father that, being lithe and graceful, she had excelled specially on the ' rings,' swinging herself from ring to ring round the gymnasium.

After the competition she had been well and happy all evening, but at 5 o'clock next morning she woke with acute abdominal discomfort, went to the closet to relieve herself, but gained no relief, but instead the pain throughout the morning became more distressing. During the morning she became increasingly feverish. In the early afternoon her condition alarmed her mother, who sent for the doctor; he, however, was out, and was only able to pay his visit early in the evening. From what I could gather there had been little or no delirium, but the development of an intense toxic, comatose state. Death supervened just about twelve hours after the appearance of the first symptom.

With this history and my findings, both negative and positive, I could only give one diagnosis—that of *fulminant menstrual peritonitis*. I concluded, namely, that whereas between mentsrual periods the uterus is sealed by the cervical plug of mucus, during menstruation the mouth of the uterus and so the way to the Fallopian tubes and peritoneal cavity is open, and that by negative abdominal pressure the contents of the vagina may thus under favourable circumstances be sucked into the peritoneal cavity. A single brief period of negative pressure might at most draw the vaginal contents into the mouth of the uterus, but a succession of acts leading to alternative positive and negative pressures in the abdominal cavity, acts such as swinging from ring to ring round the gymnasium, or again acts of prolonged negative pressure, such as balancing inverted, with feet in the air, on the ' horse ' or parallel bars, would strongly favour the suction of vaginal contents along the whole length of the female genital canal.

We know that pathogenic organisms of various orders may exist in the vagina, as in the throat, without setting up local lesions, and that of these streptococci are the most frequent. It seemed reasonable to conclude that in this case the menstrual discharge reaching the vagina had there become contaminated by a transient, virulent streptococcus, and this gaining entrance into the peritoneal cavity through the tubes had multiplied rapidly with these tragic results.

I may add that my cultures gave me nothing but this ' streptococcus longus.'

Infected Fibromyoma of the Puerperal Uterus associated with General Peritonitis and removed by Hysterectomy.

By Eardley Holland, M.D. (Lond.), F.R.C.P. (Lond.), F.R.C.S. (Eng.),

Obstetric Surgeon, City of London Maternity Hospital; Assistant Obstetric Surgeon, London Hospital.

The patient, a multipara, aged 35, was admitted to the London Hospital on November 19, 1919. She had been delivered three weeks previously of a child which weighed 6½ lb., and lived only one day; the uterus, after delivery, remained large, the placenta did not come away, so a twin was diagnosed and the patient left to nature. However, at the end of three days her doctor removed the placenta manually, and diagnosed a fibroid tumour. The patient did not become acutely ill until two days before admission, when she began to get severe abdominal pain, vomiting and high temperature.

On admission she was very ill, and presented the signs and symptoms of an acute generalized peritoneal infection. A tender, hard, round tumour was felt rising out of the pelvis, the size and shape of a uterine pregnancy of twenty-four weeks' duration. I operated at once, found generalized peritonitis, and removed the enlarged uterus by subtotal hysterectomy. The anterior surface of the tumour presented two perforations, from which pus was oozing. The patient died in thirty-six hours.

A post-mortem examination was made the next day, of which the following are the notes: "Drainage of abdominal cavity through slit cervix uteri and vagina, and also through a laparotomy wound. Dilatation and purulent inflammation of lower 3 cm. of cervical canal. Slight laceration of lower vagina. Large quantity of fibrinous deposit with little pus all over abdominal cavity. Anæmia and slight cloudy swelling of myocardium. Slight atheroma; few small fatty plaques in aortic commissure, with very few fat flecks in rest of aorta, coronaries and carotids. Partial compression collapse of inferior parts of lower lobes of lungs. Slight acute diaphragmatic pleurisy in both lower lobes. Caseous calcareous tubercular nodule in right paratracheal gland. Marked anæmia with some fatty infiltration of liver (3 lb. 3½ oz.). Œdematous spleen (5¼ oz.) with some greyish hyperplasia of pulp. Anæmia and severe cloudy swelling of kidneys (10 oz.). Marked general anæmia. No physio-

Hemisection of infected puerperal uterus, with a necrobiotic fibromyoma in anterior wall. Note pus-track between tumour and capsule, and three perforations of capsule, one into uterine and two into peritoneal cavity.

HOLLAND:

Specimen of Infected Fibromyoma of the Puerperal Uterus associated with General Peritonitis and removed by Hysterectomy.

logical activity in fibrous breasts. No pigmentation of nipples. Caries of teeth. A thin, normally developed woman."

Description of the Specimen.—The uterus was hardened in formalin and then bisected sagitally. The uterus is almost spherical in shape, with a diameter of 17 cm. The whole anterior wall is occupied by a single, spherical, interstitial fibromyoma, 14·5 cm. in diameter (Plate). The fibromyoma is foul-smelling, and its cut surface has a dirty greyish-pink colour, and a tough whorled surface with a few small areas of myxomatous cystic degeneration in it. The flattened, elongated uterine cavity, 13 cm. long, is spread out on its posterior surface. The muscular capsule of the tumour is thin. At the lower end of the uterus is the cut surface of the cervical canal. The peritoneum covering the uterus is white, with a deposit of yellow fibrin. In the middle of the anterior wall of the uterus (Plate, *a*, *b*) are two ruptures, or perforations, of the whole thickness of the uterine wall (i.e., capsule of the fibromyoma), 3 cm. and 3·5 cm. in diameter respectively. Through these perforations project part of the underlying fibromyoma, covered with a yellow slough. Through the capsule of the posterior wall of the fibromyoma is another perforation, 5 cm. in diameter (Plate *c*); as this part of the capsule forms the anterior wall of the uterine cavity, the perforation is naturally through the endometrium and into the uterine cavity. Between this perforation and the already mentioned two perforations in the anterior wall is a continuous purulent track lying between the fibromyoma and its capsule, providing a direct communication between the cavity of the uterus and the general peritoneal cavity. The endometrial surface is brown and ragged; the placental site cannot be identified with certainty, but it appears to have been in the anterior wall, i.e., over the posterior aspect of the fibromyomata.

The special point about the specimen is the occurrence of perforation of the capsule of the tumour, on the one hand into the infected uterine cavity, and on the other hand into the general peritoneal cavity, forming a direct track of infection leading to general peritonitis. The perforations are no doubt due to acute necrosis from a virulent infection acting on the capsule, rendered tense by the rapid swelling of fibromyoma it enclosed.

This seems to be an unusual form of post-partum infection of a fibromyoma. An example is reported by Jolly (*Zeitschr. f. Geb. u. Gyn.*, 1910, vol. 67, p. 500). A primigravida of 24 had a three months' abortion; the placenta was removed manually. Ten days later the patient was sent into Hospital because of pyrexia. Exploration of the uterine cavity showed it to be empty, with the mucous membrane everywhere smooth; at the same time a moderate-sized fibromyoma was felt bulging slightly into the

uterine cavity. Thrombophlebitis of the right leg appeared, and the patient died of pyæmia. Post-mortem examination revealed thrombophlebitis of the right femoral and pelvic veins, purulent parametritis and purulent thrombi in the kidneys and lungs. The origin of the sepsis was found to lie in the fibromyoma, which was of a spongy consistence and brownish-red in colour. A thin layer of pus completely encircled the tumour, occupying the position of its capsule and separating it from the surrounding uterine wall. The mucous membrane of the uterus was everywhere intact, nor was there any perforation into the peritoneal cavity. In the discussion following Jolly's report, Hammerschlag cited a similar case, with perforation of the tumour capsule into the peritoneal cavity and general peritonitis.

A Case of Rupture of the Uterus through the Scar of a previous Cæsarean Section.

By Lewis Graham, M.S. (Lond.), F.R.C.S. (Eng.).

Hon. Surgeon, Women's Hospital; Hon. Physician, Maternity Hospital; Hon. Obstet. Officer, Queen's Hospital, Birmingham.

In 1914 I was called to Mrs. M. N., an elderly primigravida, as she had obstructed labour due to pelvic contraction. The only advisable treatment was craniotomy. She recovered, and, in due course, again became pregnant. For this I performed a Cæsarean section. Her wound healed by first intention and she had a non-febrile convalescence.

A little more than a year later Mrs. M. N. was again pregnant. I was away on holiday when she came into hospital for delivery. As the pelvic contraction was not great, induction of premature birth was attempted by insertion of bougies. For some reason this treatment was given up and, on the day after the insertion of the bougies, a Cæsarean section was performed by a colleague, and a living child delivered. Two layers of continuous iodine catgut sutures were used to suture the uterine incision. Again a perfect recovery ensued without any rise of temperature.

Two years later Mrs. M. N. was pregnant again, and I was consulted as to the best method of delivery. A third Cæsarean section was advised with the promise of sterilization as she was somewhat debilitated and had now two healthy children. Six weeks before full-time the patient was admitted into hospital on account of severe abdominal pain with a heavy loss of blood from the vagina. The fœtus was noticed to be unusually mobile but no fœtal heart sounds were heard. As sterilization had been promised and the abdomen had to be opened, a vaginal examination was not made. When the abdomen was opened, the uterus was found to be ruptured with the fœtus and placenta lying free in the abdominal cavity. The membranes had already ruptured. With regret a hysterectomy had to be performed as being the most certain way of sterilizing the patient and securing a good recovery. But for the promise of sterilization I should have preferred to sew up the rent in the uterus, as I have twice done already, in cases of ruptured uterus, and in one of which the patient has subsequently had a normal delivery and recovery. In the case now under con-

sideration the rent was " clean-cut " in the site of the Cæsarean section wound and, with trimming up its edge, should certainly have produced a strong scar capable of withstanding another pregnancy. The patient made a perfect recovery.

Pathological Report by Dr. Laurence Ball. The uterine muscle shows a general diffuse fibrosis. Healing at the site of incision has been imperfect in the deeper two-thirds of the scar, the granulation tissue being cellular, vascular and imperfectly organized. There is an ingrowth of columnar epithelium of the endometrium into the scar showing that union never occurred on the deep (endometrial) aspect.

The Gynæcological Visiting Society.

The Gynæcological Visiting Society, the inaugural meeting of which was held in Liverpool in 1911, met again in that city on December 2nd and 3rd, 1921, in celebration of the tenth anniversary. The following members were present: Professors W. Blair Bell, W. E. Fothergill, J. M. Munro Kerr, C. G. Lowry, E. J. Maclean, W. C. Swayne, Drs. H. Russell Andrews, H. Clifford, D. Dougal, W. Fordyce, W. Gough, R. W. Johnstone, Cuthbert Lockyer, H. Leith Murray, D. C. Rayner, W. Fletcher Shaw, J. H. Willett, H. B. Whitehouse, J. Young, Messrs. Comyns Berkeley, Victor Bonney, Eardley Holland, T. G. Stevens, Clifford White.

On December 2nd, at Shaw Street Hospital for Women, Dr. H. Leith Murray performed a plastic vaginal operation for procidentia, and another for laceration of the perineum. He also performed ventrifixation, with suture of the fundus of the bladder to the parietal peritoneum, for dyspareunia due to retroflexion of the uterus with prolapsed appendages.

Dr. J. H. Willett operated in the afternoon in the same hospital for an ovarian dermoid, for bilateral salpingitis, and for retroversion of the uterus associated with lacerated perineum.

On December 3rd, Professor W. Blair Bell at the Royal Infirmary, performed a Cæsarean section for contracted pelvis, demonstrating his method of suturing the uterine wound (described in the "Journal of Obstetrics and Gynæcology of the British Empire," vol. 28, nos. 3 and 4, page 530). Professor Blair Bell next performed, for prolapsus uteri, amputation of the cervix with anterior and posterior colporrhaphy—illustrating his "buttress" method—followed by a modified Gilliam's operation. The same operator next showed his operation for bilateral pyosalpinx salpingoöphorectomy with removal of a transverse wedge-shaped piece of the fundus uteri, and grafting portions of an ovary in the rectus muscle. Mr. R. A. Hendry, Honorary Assistant Gynæcologist to the Royal Infirmary, performed vaginal hysterectomy for early carcinoma of the corpus uteri.

In the afternoon a pathological meeting was held at the

Department of Obstetrics and Gynæcology at the University. The following items formed the programme :—

1. A curious case of pelvic infection. Vice-Chancellor ADAMI. (Reported on page 104 in this number of the Journal.)
2. An apparatus for use in examinations for the Wassermann reaction. Professor ERNEST GLYNN.
3. Some observations on the bacteriology of infected Fallopian tubes. Dr. H. LEITH MURRAY.
4. An apparatus for blood-transfusion. Professor W. BLAIR BELL.
5. Intracranial birth injuries. Dr. N. CAPON.
6. Some gynæcological specimens. Mr. R. A. HENDRY.
7. A discussion on the operations performed.

In the evening a dinner was held at the Adelphi Hotel to which Vice-Chancellor Adami, Sir Robert Jones, and Dr. Gemmell were invited.

C. B.

Review of Current Literature.

THIS Review will contain the lists of contents, and abstracts of the more important articles, from the following journals, with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges:—

British.—Lancet, British Medical Journal.

American.—American Journal of Obstetrics and Gynæcology; Surgery, Gynæcology and Obstetrics.

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.

Italian.—Annali di ostetricia e Ginecologia.

German.—Archiv für Gynäkologie; Monatsschrift für Geburtshülfe und Gynäkologie; Zeitschrift für Geburtshülfe und Gynäkologie; Zentralblatt für Gynäkologie; Muenchener medizinische Wochenschrift.

It is hoped that the Review of Current Literature will keep the readers of this Journal in touch with current work throughout the world. At the end of each year it is proposed to print an Index of all the subjects contained in the articles of the above journals. Arrangements will also be made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London.—MALCOLM DONALDSON, F.R.C.S.; A. C. PALMER, F.R.C.S.; L. DOROTHEA TAYLOR, M.D.; FRANK E. TAYLOR, F.R.C.S.

Birmingham.—LEWIS GRAHAM, F.R.C.S.; HILDA N. SHUFFLEBOTHAM, F.R.C.S.

Coventry.—G. G. ALDERSON, F.R.C.S.

Manchester.—F. H. LACEY, M.D.; W. R. ADDIS, M.B.

Sheffield.—W. W. KING, F.R.C.S.

Glasgow.—JAMES HENDRY, M.D.

Pre-Natal Death.

ARTHUR ROBINSON (*Edin. Med. Journ.*, 1921, March). This is the sixth "John Struthers" Lecture, delivered by the author, Professor of Anatomy at Edinburgh University, before The Royal College of Surgeons of Edinburgh.

(A) *Statement of Thesis.*

By pre-natal death is understood the death of the extruded ovum or of fertilized developing ova at any period up to the termination of gestation.

It has been held in the past (*a*) that any ripe extruded ovum can be fertilized by any spermatozoon, in any animal group, and result in the eventual production of a living individual; (*b*) that, excepting "sexual incompatibility," sterility and pre-natal death

are due to pathological conditions affecting the parents, their genital glands and tracts—the ova and spermatozoa, etc.

The author maintains that these views need modifying; that union between spermatozoon and ovum is not only selective to a certain extent, but that pre-natal death is of frequent, regular, and usual occurrence in many groups of healthy animals under healthy normal conditions; that there is a normal as opposed to a pathological waste of life; that a proportion of ova before and after fertilization are destined to die; and that such factors must be given due weight in estimating the causation of sterility.

(B) *The work done in support of this contention* consisted in (1) An analysis of the mating records of 390 Clydesdale stallions with 28,241 mares (extending over a period of six years), and of 43 thoroughbred stallions with 3,640 mares (over a period of five years). (2) Expermeints on 165 inseminated ferrets, representing a total production of 1,643 ova. (3) An analysis of the results of other workers with similar experiments on pigs, rabbits, rats, guinea-pigs and chickens.

In these two experimental groups it was ascertained (1) what the ovum extrusion rate was in each animal; (2) what the actual birth-rate was in each animal; (3) from comparison of (1) and (2) what was the pre-natal death-rate, and when it occurred, *i.e.*, before or after fertilization of the ovum, and if the latter, before or after decidual gestation.

(C) *Details of Work.*

The Horses. Only 52% of the Clydesdales foaled, *i.e.*, 48% pre-natal death-rate, *i.e.*, 13,560 ova disappeared from a total of 28,241 extruded. Only 42.32% of the thoroughbreds foaled, *i.e.*, a pre-natal death-rate of 58.68%. Moreover variations in this rate in association with the matings of individual stallions and of one stallion as compared with another was very considerable, ranging from 0% to 100%. All the stallions were certified healthy, and all the mares were presumably healthy, though no systematic examination of genital tracts or post-mortem was made in any case of the mares.

The Ferrets. Serial sections of the ovaries of all the 165 ferrets were cut. As these animals ovulate only after insemination and when spermatozoa are in the oviduct, the total number of corpora lutea counted in the serial sections gives the total number of extruded ova all of which have had opportunity to meet spermatozoa.

From macroscopical and microscopical examinations carried out at intervals varying from 18 hours to 42 days (*i.e.*, the termination of gestation) the number of fertilized developing ova or embryos was ascertained and also their normal or abnormal condition. So, by

comparison, a resulting pre-natal death-rate of not less than 35% was calculated. The results of these experiments tallied with those of the horses, for in both the pre-natal death-rate was high, and in both the individual variations were great, ranging from nothing for some animals to 100% for others. Moreover, all the ferrets were healthy—proved such by post mortem examination—and lived under healthy conditions.

(D) *Where, When, and How, Does this Death of Ova and Zygotes Occur?*

Macroscopical and microscopical examinations showed that they died and were lost in the peritoneal cavity, in the peri-ovarial capsule from which they failed to escape, in the oviducts, and in the uterine cornua. They died before and after fertilization; as ova because they failed to unite with spermatozoa, even when these were present and with adjacent ova being fertilized. They died as zygotes because the structure of the fertilized ova was incompatible with development to term, or because several spermatozoa entered the ova. They died in the morula and the blastula stage, both before and after attachment to the decidua, and when the zygote had become an embryo with appendages. No signs of inflammation were present. No micro-organisms were found, and no local differences in blood supply could be adduced as causes of death. Almost invariably normally developing zygotes were found on either side of the dead zygote. They perished by alterations in their structure ending in disintegration because of their incompetency to live and develop under conditions quite favourable to immediately adjacent zygotes. The same events occur, moreover, in many groups of animals, in all parts of the oviducts and cornua, and at all periods of gestation.

(E) *The Causation of this Pre-Natal Death.* Considerations and suggestions.

The following possibilities were considered:—

(1) Faulty health of the parents.
(2) Faulty environment of the parents.
(3) Faulty food of the parents.
(4) Parents too old.
(5) Over-use of the male.
(6) Faulty environment of the gametes and zygotes.
(7) Faulty nutrition of the gametes and zygotes.
(8) Faulty structure of the gametes and zygotes.

And in every case the conditions of the experiments were such as to negative directly, or make it very unlikely that the above factors exercised any influence on the causation of pre-natal death.

"The records of the ferrets show that some ova, though

apparently normal, are incapable of uniting with some spermatozoa, while other ova, though capable of such union, form zygotes incapable of developing to term, and this under co-existing circumstances in which other adjacent ova do unite with spermatozoa and evolve viable young."

The records of the horses likewise show that the spermatozoa of certain stallions are incapable of union with the ova of certain normal mares, to produce viable young, whereas with other stallions and mares this does not hold good.

The records as a whole show a high percentage death-rate for the ova of many different groups of animals widely separated, *i.e.*, 48% Clydesdale horses, 58% thoroughbreds, 35% ferrets, 35% sows, 37% rabbits, etc., and the author suggests that an equally high or even higher rate may eventually be found to exist in genus 'Homo.'

If 100 married women between 15—45 years produced 100 children in each year, then the pre-natal death-rate from 1876—1880 was over 70%, and increased by 1910 to over 78%.

No method exists of ascertaining the true pre-natal death-rate in man, but by comparison, assuming it is 40% (probably too low an estimate the author thinks), then one-half of this percentage is the result of unavoidable causes in which no treatment of the mother is beneficial and may even be harmful. Moreover, he points out that in animals with multiple pregnancies the death of a zygote, unless near term, is followed usually by its absorption by the decidua so as not to endanger the life of the adjacent normal zygotes. In these cases histological examination of the decidua shows a state strictly comparable to that seen in human uteri, and which is usually attributed to decidual disease or degeneration, and which consequently is looked upon as the cause and not the effect of pre-natal death.

In healthy normal animals disease of the decidua is not found, and the observed decidual condition is the '*result*' of the pre-natal death, *not its cause*; in other words, it is not degenerative but progressive, and in the interests of more rapid and facile race productions. Moreover, the author suggests that the structural composition of the gametes which decides their union and subsequent complete development is the outcome of the embryological process of maturation. This phenomenon, while normally responsible for the valuable individual variations which characterize all animal groups, at the same time leads to alterations in the constitution of some gametes which prevents their union with gametes of the opposite sex or influences it in such a way as to prevent complete development to term after union has occurred. In other words, sexual incompatibility is the result of structural peculiarities

of the gametes arising out of the process of maturation, a side issue of the process responsible for ' variations.'

(F) *Summary and Conclusions.*

The conclusions may be summarised :—

1. Some sterility is normal and unavoidable.

2. A considerable amount of pre-natal death is normal, usual and unavoidable.

3. This pre-natal death is due to the inability of gametes of certain individuals to unite with one another, or when so united to form a zygote capable of complete development.

4. This inability is not dependent on disease, either general or local, or on environment.

5. A considerable number of abortions are normal regressive processes preventing diminution of the birth-rate by the more rapid establishment of a normal pro-œstral uterine mucosa.

6. That the condition of the uterine mucosa in such cases is normal, regressive and useful, and not degenerative or inflammatory, and that treatment is therefore unnecessary and detrimental.

LEONARD PHILLIPS.

A note on the early recognition and corrective treatment of occipito-posterior presentations. R. C. BUIST (*Brit. Med. Journ.*, Nov. 12th, 1921). Buist begins with a few remarks about the exact diagnosis of these presentations by abdominal palpation. The external treatment he describes is simple, and he has found it nearly always successful. A binder is laid under the patient and two towel pads are prepared. The first is rolled to about the thickness of a forearm, the second is folded to a flat pad 6 or 7 inches square. The rolled pad is pinned to the binder in such a position that when the binder is firmly secured the pad will lie close in front of the anterior superior iliac spine behind and parallel to the trunk of the fœtus. The flat pad is pinned so as to lie on the limbs, pressing them backwards. It is sometimes useful to roll the patient to the side opposite the trunk and by hand bring the trunk as far as may be over to that side. The binder is then pulled firmly home. If the patient is actually in labour nothing more may be needed, but if she is still on foot the binder should be steadied by thigh-bands and the correctness of its position frequently supervised. When in bed the patient should be encouraged to lie on the side opposite to the trunk, but her comfort is a prior consideration. E. H.

Spasmodic stricture of the uterus. M. A. DOBBIN CRAWFORD (*Lancet*, Jan. 28th, 1922). The patient was a iv-para whose former labours had all been prolonged and difficult. She stated her doctor had said that " there was a shelf inside her preventing the birth," suggesting strongly that the uterine condition was habitual with every labour. At the present labour the fœtus was presenting by the vertex. The pelvis was not contracted and the abdomen was pendulous. Labour started at midnight and the pains were very slight for some hours; when seen at 8 a.m. she was still in the first stage, the os dilating slowly, membranes intact; a quarter grain of morphine

was given and she was instructed to go to bed and sleep. She was next seen at 11 a.m. and was found to have been in very severe pain for some time, the cervix being three-quarters dilated. The membranes were ruptured and chloroform was administered for about two hours. It was now thirteen hours since the start of labour. The head showed no sign of fixation, and as no cause could be perceived for the delay, a careful examination was made under an ether anæsthetic. The cervix was found to be fully dilated and empty, the free edge hanging flaccid from the upper part of the vagina. During each pain the head would descend into the cervix only to recede again. With difficulty the hand was passed up beside the head and found the uterine muscle firmly contracted in a ring round the child's neck. Both mother and child were in very good condition, but the contraction-ring must have persisted for some hours in spite of prolonged chloroform followed by deep ether anæsthesia. As the contractions were really alarming the patient was moved into hospital so that if the spasms did not relax within a reasonable time Cæsarean section would be available. The patient was not allowed to regain consciousness, but was kept quiet with chloroform until shortly before her arrival at hospital. As the ambulance drew up the child was born—a living boy weighing 9 lbs. The subsequent history was uneventful.

The author discusses the history, etiology and treatment. Treatment is discussed very fully both in the light of the present case and of former reported cases. The author comes to the conclusion that the correct treatment for this condition is deep anæsthesia, if necessary, prolonged, and nothing else; this treatment will, she believes, very nearly eliminate the necessity for Cæsarean section. E. H.

A case of intraperitoneal rupture of the bladder due to retroversion of the gravid uterus. D. CHATTAWAY (*The Lancet*, October 8th, 1921). The patient had acute abdominal symptoms complicating a four months' pregnancy. A fortnight before admission she had retention of urine followed by incontinence. No catheter was passed; after the onset of the acute abdominal symptoms no urine was passed. On admission a diagnosis of intraperitoneal rupture of the bladder was made, and when the abdomen was opened about a gallon of foul urine was found in the peritoneal cavity and there was a rupture about 2 inches long at the fundus of the bladder. This was sutured with catgut and the abdomen was closed and drained. The interesting features of the case are its great rarity, and the fact that the patient was able to make an uninterrupted recovery after having a large amount of foul urine in the peritoneal cavity for 30 hours. E. H.

A method of inducing labour. GIBBON FITZGIBBON (*The Dublin Journal of Medical Science*, June 1921). Fitzgibbon recommends a No. 20 to 24 soft rubber stomach tube, 30 inches long. The end of the tube is passed into the cervix and the tube gradually pushed in until it is all in the uterus; it will then be found to have coiled itself in front of the presenting part in rings about 3 inches in diameter, and is left so until labour starts and is well established. When the os is half dilated or more the tube can easily be removed. When introducing the tube it may be found that after about 4 inches are introduced the tube refuses to go further. If this occurs, giving the tube a slight twist on its long axis while pressing inwards or changing the direction of pressure, without withdrawing the part already in, will

start the tube going in again. Once the tube bends it continues to do so and coils itself quite easily.

The advantages claimed are :—(1) Greater ease and certainty of sterilization ; (2) Practically complete absence of risk of rupturing the membranes ; (3) In the uterus it is confined to the lower uterine segment and so avoids the possibility of disturbing the placenta and carrying possible infection up to the region of the placenta ; (4) It is as stimulating as the bougies ; in all probability it is more so, as it is all in the lower segment and exerts a slight elastic pressure from its coiled position. E. H.

Persistent cloaca with imperforate anus as a cause of fœtal ascites. J. N. CRUICKSHANK (*Brit. Med. Journ.*, December 10th, 1921). This case presents features of interest both from the obstetrical and embryological points of view. According to her dates the patient was 4½ months' pregnant. When examined after having been in labour for 24 hours, with ruptured membranes, the abdomen was found enlarged to full-time dimensions and a soft tumour-like mass presented ; the mass was punctured and several pints of fluid escaped under high pressure. The fœtus was then delivered without further difficulty. The placenta was normal in appearance and weighed 1½ pounds. The Wassermann reaction was negative. The fœtus was 21 cm. long and weighed 935 grams, and was slightly macerated. The centres of ossification indicated that the stage of development was prior to the sixth lunar month. Dissection of the fœtus showed that the abdomen had been enormously distended before the evacuation of the fluid ; the parietes hung loosely over the abdominal viscera, and most of the abdominal organs showed the effects of pressure. A thickened mass was felt behind the peritoneum of the posterior abdominal wall ; on closer investigation this was found to be a large collapsed retroperitoneal sac with muscular (unstriped) walls and smooth serous lining. The lower end of the sac extended into the pelvis and was attached by a short thick band of fibrous tissue to the pelvic floor just below the tip of the coccyx. On the internal aspect of the sac, opposite this attachment, there was a minute dimple, but no opening. Passing forwards, the sac blended with the anterior abdominal wall at the umbilicus. In the upper part of the sac there was an opening which was found to communicate with the large intestine. The kidneys were in normal position and the ureters were found to enter the posterior aspect of the sac near its upper end. There was no bladder and the penis was rudimentary. Full details of the very careful dissection are given.

Although the case is one of fœtal ascites from the clinical point of view, it cannot be regarded as such in the true sense of the term. It is evidently a case of persistent cloaca. The embryology of the parts affected is discussed and a short review of the literature is given. E. H.

American Journal of Obstetrics and Gynæcology.

August, 1921.

American gynæcology : an appreciation. W. W. CHIPMAN.
The unsolved problems in gynæcology and obstetrics. W. BLAIR BELL.
The frequency and cause of abortion. ARTHUR WILLIAM MEYER.

Spontaneous evolution following transverse presentation of the fœtus, with report of a case. MATTHEW MARSHALL.

The significance of the pelvic outlet in perineal lacerations, cystocele and prolapse. ARTHUR MORSE.

*Post-operative tetany due to sodium bicarbonate. WILLIAM P. HEALY.

Drainage of pus-forming lesions of the abdominal cavity. J. W. KENNEDY.

A brief for the use of iodine in the preparation of women for delivery. BURNLEY LANKFORD.

The behaviour of the uterus in eclampsia : a case report. M. PIERCE RUCKER.

Reports of two cases of fimbrial cysts : one with twisted pedicle and gangrene complicating pregnancy and one simulating an ectopic gestation. HARRY COHEN.

A histological study of fœtus and implantation site in a case of missed abortion. J. P. GREENHIL.

Post-operative tetany due to sodium bicarbonate. The author reports six instances of post-operative tetany which were traced to enemata of bicarbonate of soda.

These cases occurred irregularly over a period of four months. The first four terminated fatally, and the two who recovered did so as the result of the administration of calcium salts.

The symptoms were tachycardia, profuse diaphoresis, hyperpyrexia, epigastric distress, bilateral symmetrical spasms and contractions of muscles, especially of the upper extremity, and convulsions.

The prompt recovery of the fifth and sixth cases following the administration of calcium lactate satisfied the author that he was dealing with a form of tetany of chemical origin. The source of the trouble was finally traced to the glucose and sodium bicarbonate enemata administered as a routine after major operations. This was supposed to contain 5 per cent. glucose and 5 per cent. sodium bicarbonate in eight ounces of water. It was given as soon as possible after the return of the patient from the operating room and repeated again in four hours. Through an error in calculation, 1,200 grains of sodium bicarbonate was given instead of 180 grains, and apparently enough was absorbed in a short time to upset the normal relations between the sodium, potassium, calcium and other ions in the neuro-muscular tissues resulting in the symptoms described.

Similar cases have occurred in children and in a case of diabetic coma treated by intravenous sodium bicarbonate.

A seventh case is said not to have received the bicarbonate enema but the patient stated that her sister had similar symptoms after an operation. This was probably an instance of latent tetany brought on by the shock of operation. This case had none of the constitutional symptoms of toxæmia shown by the others and is included only to emphasize the prompt response to the administration of calcium lactate. The question of importance to be decided was whether it was possible for these patients, under the conditions described, to absorb enough sodium bicarbonate to give rise to the symptoms observed. If so, was the resultant condition one of alkalosis due to the administration of an excessive quantity of sodium bicarbonate, or was it one of sodium poisoning in which the symptoms resulted from a disturbance of the balance of normal relations between the basic ions?

September, 1921.

*The fads and fancies of obstetrics. A comment on the pseudo-scientific trend of modern obstetrics. RUDOLPH W. HOLMES.

*Forced labour; its status in obstetric teaching. JOHN OSBORN POLAK.

The drudgery of obstetrics and its effect upon the practice of the art, with some suggestions for relief. BROOKE M. ANSPACH.

*Basal metabolism in pregnancy and the puerperium. JOSEPH L. BAER.

A comparison by statistical methods of certain external pelvic measurements of French and American women. FRED L. ADAIR.

Acute malignant endocarditis complicating pregnancy. PALMER FINDLEY.

*Observations on ectopic pregnancies. JOHN OSBORN POLAK.

*The incidence of pulmonary embolism and thrombosis following hysterectomy for myoma uteri. LILIAN K. P. FARRAR.

The fads and fancies of obstetrics. Taking as his text a statement that the maternal and fœtal death rate is as great in Maternity Hospitals as it was a hundred years ago, Dr. Holmes argues for conservatism in obstetrics. He pleads for scientific investigation of antenatal pathology as being the surest way to lower infantile mortality, and he claims that as pregnancy is not a disease, it does not call for surgical methods.

Forced labour: its status in obstetric teaching. The author claims that it is unsafe to teach students such obstetric procedures as prophylactic forceps, elective version, Cæsarean section, and forced expulsion of the placenta. These may be carried out in individual cases by the Specialist, but they are dangerous weapons in the hands of the inexperienced.

Basal metabolism in pregnancy and the puerperium. Baer, in a study of 44 cases finds that the basal metabolic rate, as estimated by oxygen consumption, averages 33 to 35 per cent. above normal. The rate falls to normal at about the tenth day after delivery. Death of the fœtus in late pregnancy is detectable in a woman, otherwise normal, by a drop in the basal metabolic rate as compared with the average.

Observations on ectopic pregnancies. The data on which the paper is compiled cover 307 cases of ectopic pregnancy which have occurred in the author's service. Of this number three have had full-term abdominal pregnancies and five others have terminated in the secondary rupture of an intra-ligamentous pregnancy at the third, fourth and fifth months respectively. The remaining 299 cases ruptured or aborted before the twelfth week. The patients fall into three distinct groups:

(1) In women with a previous history of infection from any cause. (168 cases.)

(2) In women presenting a definite history of dysmenorrhœa associated with maldevelopment and sterility (94 cases).

(3) In women who have suffered repeated intrauterine pregnancies ending in abortion (27 cases).

There were 39 cases of unruptured tubal pregnancy; 199 cases of tubal abortions, and 61 cases of actual tubal rupture. Of these last, 18 were intraperitoneal hæmorrhages and 43 were intra-ligamentary. In the great

majority of the cases the gestation sac was ampullary, but it is interesting to note that there were three cases of pregnancy in the stump of a previously amputated tube, and eight followed angulation of the tube caused by a Gilliam or Baldy-Webster operation.

The cases fall into two groups :—(1) Those in the " non-tragic " stage with a pulse of 100 or under (263 cases), and (2) those in the " tragic " stage who are pulseless at the wrist and show definite signs of internal hæmorrhages (36 cases).

Three of the patients died before operation, two from shock and hæmorrhage and five from peritonitis. The author lays great stress upon the following points in the history : colicky pains in the region of the affected tube and slight bleeding and pain in defæcation occurring after a varying period of amenorrhœa.

The physical signs of importance are :—a slight elevation of temperature, a moderate leucocytosis and an exquisite sensitiveness of the cervix on movement, together with a tender swelling on the affected side which tends to gravitate towards the pouch of Douglas. The uterus is enlarged and often displaced, but Hegar's sign is absent, and softening of the cervix is unreliable. The pulsation of the uterine artery is more apparent on the side of the gestation sac, and this is particularly noticeable in intraligamentous ruptures. When rupture or tubal abortion takes place there is sudden pain with shock of greater or less degree. If the hæmorrhage is severe the patient passes into collapse with increasing pulse frequency, a fall in blood pressure and a leucocytosis. Since rupture or abortion generally means death of the ovum, the uterine decidua is cast off piecemeal or entire.

Primary rupture or abortion generally occurs before the eighth week and is seldom attended with tragic symptoms. There is usually an intervening period of several days more before rupture takes place. This was found in 80 per cent. of tubal pregnancies making up this series.

Unruptured tubal pregnancy should be operated upon when diagnosed, but in the author's opinion the " tragic " cases should be operated upon in the stage of reaction. Until this stage is reached the author advises morphia in large and repeated doses, but he thinks that intravenous saline is dangerous.

An interesting discussion followed the paper, which was read at a Joint Meeting of the New York and Philadelphia Obstetrical Societies in March 1921.

The incidence of pulmonary embolism and thrombosis following hysterectomy for myoma uteri. The purpose of this paper is to draw attention to pulmonary emboli as the cause of most post-operative lung complications. Three cases are recorded by the author in which the symptoms seem to prove that the post-operative " pneumonia " was of embolic origin. Pain in the chest, rapid pulse, and hæmoptysis were the leading signs upon which the diagnosis was made, but the duration of the temperature was much shorter than is the case in ordinary pneumonia. These symptoms come on during the first forty-eight hours after operation, which is too soon, in the author's opinion, for an infective condition to have developed.

The emboli arise in the pelvic veins, and the author suggests that this complication can best be avoided by rest in bed for a week prior to operation, together with blood transfusion.

October, 1921.

ORIGINAL COMMUNICATIONS.

*Pneumoperitoneum and Röentgenology as aids to more accurate obstetric and gynæcologic diagnosis. REUBEN PETERSON.

*Vaginal supracervical hysterectomy with interposition of the cervical stump for cystocele and procidentia associated with enlargement of the uterus. HIRAM N. VINEBERG.

The interpretation of vesical symptoms in gynæcological diagnosis. F. E. KEENE.

*Certain dietary factors in the causation of sterility in rats. E. REYNOLDS and D. MACOMBER.

*A technique for the management of the large cystocele when associated with non-malignant disease of the cervix and myomata uteri. LILLIAN K. P. FARRAR.

*Sterility studies. Simplified methods in diagnosis. W. H. CARY.

A preliminary report on the treatment of syphilis complicating pregnancy. A. C. BECK.

SOCIETY TRANSACTIONS.

American Gynæcological Society, June Meeting. The New York Obstetrical Society, April Meeting. New York Academy of Medicine, Section on Obstetrics and Gynæcology, April Meeting.

DEPARTMENT OF REVIEWS AND ABSTRACTS.

Collective Review—Antenatal syphilis. A. N. CREADICK.

Selected Abstracts—Eclampsia.

Pneumoperitoneum and Roentgenology as aids to more accurate obstetric and gynæcologic diagnosis. The purpose of the communication is to give the results of some 300 cases in which X-ray examinations have been made after the injection of the pelvic and abdominal cavities with gas. Team work is essential, for the surgeon must associate himself with a radiographic expert. The author uses both trans-uterine and trans-peritoneal methods of inflation. He considers that the former is, on the whole, the most valuable procedure, but it should not be used with infected tubes.

Carbondioxide gas is used in preference to oxygen as it is more quickly absorbed, and therefore the discomfort occasioned by the injection passes off sooner. On the other hand the X-ray must be taken within half-an-hour. One thousand cubic centimeters are injected in about four minutes, and the photograph is taken with the patient head down upon an inclined table. The thigh rests upon a specially designed support so as to raise the pelvis. A detailed account is given of the technique adopted.

Peterson is convinced that gas inflation is free from danger and forms a valuable addition to our diagnostic methods. By its means adherent appendages, deviations of the uterus, neoplasms, early pregnancy, etc., can be readily detected.

Bimanual pelvic examination and pelvic pneumoperitoneal Röentgenography are not antagonistic diagnostic methods. Each is valuable and their value is enhanced if they are used in conjunction.

Vaginal supracervical hysterectomy with interposition of the cervical stump for cystocele and procidentia associated with enlargement of the uterus. The author, who is accustomed to use the interposition operation for vaginal prolapse, has found that in some cases the uterus is too big to allow of the operation

being performed; in other cases menorrhagia and metrostaxis may demand treatment in addition to the cystocele and rectocele. The surgical procedure hitherto employed has been to remove a portion of the anterior wall to reduce the bulk of the uterus. This being unsatisfactory, Vineburgh has designed an interposition operation in which amputation of the cervix and vaginal subtotal hysterectomy are combined. The cervical stump is sutured to the sub-pubic fascia. The various steps of the operation are well illustrated.

The operation has been performed 113 times with a mortality of 1.7 per cent., and of 37 patients, with whom the author has been able to keep in touch, nearly 11.0 per cent. have had recurrence of their prolapse.

Certain dietary factors in the causation of sterility in rats. For the purposes of this experimental work rats of a well proved strain of fertility were subjected to deficiency diets without any other change in their life conditions.

Three diets were arranged so that they were respectively deficient in the three well-known vitamine elements; a fourth diet, deficient in both calcium and protein, was added on the ground that it was at least a partial representation of the war diets from which portions of Europe have suffered. The authors think that their experiments have already shown that dietary deficiencies which are too slight to produce ill-health or even marked loss of condition, nevertheless result in a high percentage of infertile matings. They also show that many of these apparently "sterile" individuals are capable of reproduction when re-mated to highly fertile animals.

The authors conclude provisionally:—

(1) That a moderate decrease in the percentage of vitamine, protein or calcium in an otherwise excellent diet produces a definite decrease in the fertility of rats.

(2) That a slight decrease in the fertility of both partners will produce sterile mating.

(3) That the fertility of the mating may be stated as the product of the fertility of the individuals, and that if the "index" falls below a certain point the mating will be sterile.

(4) That diminished fertility sometimes results in the appearance of abortion.

(5) That deficiency in both proteins and calcium results in visible ill-health and great infertility.

A technique for the management of the large cystocele when associated with non-malignant disease of the cervix and myomata uteri. The actual technique of the operation having been omitted—presumably by a printer's error—this article loses any value which it might otherwise have had. One gathers from the pictures, however, that the author first amputates the cervix and performs a plastic operation upon the anterior vaginal wall. He then opens the abdomen and, after subtotal hysterectomy, sews together all available structures in the region of the cervical stump.

Sterility studies: simplified methods in diagnosis. Cases of sterility fall into three groups:—(1) Patients with such gross pelvic lesions that pregnancy is impossible. (2) Patients with minor pelvic conditions, such as displacements, conical cervices, etc., and (3) Patients with no demonstrable abnormality.

Much has been written as to the causal relationship between minor pelvic lesions and sterility, but the author thinks that a careful study on the lines which he lays down will demonstrate that they are very rarely responsible for the sterility.

In cases belonging to groups (2) and (3) the first step in the investigation is to carry out what the author calls the " insemination " test. This consists in the examination of the seminal fluid in the female genital tract about forty minutes after coitus. About a drachm of fluid will be found in the vagina and a sample of this is examined for spermatozoa. The vagina and cervix are then carefully cleaned and by means of a pipette, a sample of the fluid in the cervical canal is obtained for microscopic examination. From four to sixteen active spermatozoa should be found in each field under normal circumstances. If the male elements are found in the cervical canal in the correct numbers and their motility is normal the potency of the male is assumed. If, on the other hand, no spermatozoa are present in the vagina the male responsibility is clearly established and the problem is transferred to the genito-urinary surgeon. The sperm content may be normal but the motility absent if deficient. In this event only two conditions are possible : either the male element has been deficient from the beginning, or, having been normal, has been adversely affected by the vaginal secretion. To determine the correct hypothesis a specimen is obtained directly from the husband by one of the methods described by the author in a previous paper (*Amer. Journ. of Obstet. and Gynæcol.*, 1916, lxxiv, No. 4). Should this prove that the male ejaculates normal seminal fluid, and a second " insemination " test shows that the spermatozoa are again absent or deficient in the vagina, it is fair to assume that some peculiarity of the woman's secretions is the cause of their destruction. Cary finds that hyperacidity of the vaginal discharge is always the cause of the death of the spermatozoa. Treatment by alkaline douches would be indicated in such a case.

If the " insemination " test is positive any minor abnormalities of the pelvic organs should be corrected. If pregnancy does not supervene within about seven months the patient passes automatically into group (3), that is, she becomes a patient with no demonstrable pelvic lesion who is sterile. Most patients in this group are sterile because the Fallopian tubes are closed. The patency of the tubes may be tested by gas inflation or by the injection of salt solution through the cervical canal. It has been found experimentally that the uterine cavity can only contain eight to ten minims of fluid, and that if as much as sixteen minims can be injected the fluid must have passed on into the abdominal cavity. The simple technique of this test is given. W. W. KING.

November, 1921.

ORIGINAL COMMUNICATIONS.

*The development of the hymen. F. J. TAUSSIG.

*Hæmorrhage from the non-pregnant uterus in the absence of neoplasm. W. A. SCOTT.

Ovulation and menstruation as post-operative considerations. T. J. WATKINS.

*Radical conservation in the surgical treatment of chronic adnexal disease. FREDERICK C. HOLDEN.

*The disposition of the uterus fololwing salpingectomy where it is desirable to preserve menstruation. C. CULBERTSON.

*Concerning torsion of the uterine adnexa occurring before puberty, together with a consideration of torsion of normal adnexa. Report of a case and a review of the literature since 1900. R. R. SMITH and W. J. BUTLER.

Management of abortion from a study of 530 consecutive cases. O. A. GORDON, JR.

SOCIETY TRANSACTIONS.

American Gynæcological Society, June Meeting. The New York Obstetrical Society, May Meeting. New York Academy of Medicine, Section on Obstetrics and Gynæcology, May Meeting.

DEPARTMENT OF REVIEWS AND ABSTRACTS.

Collective Review—Blood transfusion. G. S. CURRIER.

Selected Abstracts—The new-born infant.

The development of the hymen. Writing in 1908 the author produced evidence which pointed to the origin of the hymen as a connective-tissue proliferation on the caudal aspect of the entrance of the vagina into the urogenital sinus. He had hoped that the point would have been worked out more fully, but, as this has not been done, he restates his theory and claims that it is supported by the study of twenty embryos varying from 15.5 to 33.5 cm. head-breech measurements.

TAUSSIG is probably right in his contention that the hymen is a new formation and not the remains of the lower end of the Müllerian ducts, but this paper of his can hardly be said to prove it.

Hæmorrhage from the non-pregnant uterus in the absence of a neoplasm The histological findings in cases of idiopathic bleeding vary in the experience of different observers, and there is no one constant finding. Most of the uteri which have been studied have had hypertrophied walls, in which thick blood vessels were surrounded by plaques of elastic tissue, and most authorities have assumed that the bleeding depends upon these findings. But idiopathic bleeding also occurs in other types, and it is not uncommon to find small sclerotic uteri which bleed just as profusely. Moreover, it is possible to find many uteri exhibiting any or all of the described histological findings which do not cause excessive loss.

The series of cases which form the basis of the paper consist of 126 specimens which have been stained both for fibrous and elastic tissue. Of these cases, 92 had excessive loss, but both the naked-eye and microscopic findings varied so greatly that it appeared improbable that the bleeding was actually caused by any changes in the myometrium or vessels. This opinion was strengthened by a consideration of the 34 cases in which the loss was not excessive when exactly the same inconstancy was found in the pathological condition of the uteri. The author claims that the only histological finding which was at all constant was hyperplasia of the endometrium, and this was present in a large proportion of the bleeding cases (69 per cent.); and he has yet to find a typical case of hyperplasia of the endometrium unaccompanied by bleeding. The author cannot therefore support Fletcher Shaw's work and has to look elsewhere for a cause of the hæmorrhage, and, naturally, turns to an endocrine hypothesis for

an explanation. His arguments in support of this theory are not convincing. He is, however, on surer ground when he says that "treatment must be directed against the bleeding uterus rather than the underlying endocrine disturbance." He advocates hysterectomy, X-rays or radium therapy, and wisely points out the necessity for a careful exploratory curettage before making use of either of the last two alternatives.

Radical conservatism in the surgical treatment of chronic adnexal disease. Holden would have done more service to the cause of conservative surgery had he delayed publication of his operative procedure until he had records of more than nine cases with two failures—all operated upon within eighteen months.

He recognizes the futility of "conserving" an ovary whose blood supply is inadequate, and hence proposes to slit up a pyosalpinx and sew the posterior cut edge to the back of the round ligament. He has taken cultures in all cases from the tubes, and his patients are to be congratulated that all the reports were negative. It is a gilt-edged gamble that any given pus-tube is gonococcal, and perhaps the author was wise in publishing his cases before fate threw a streptococcal tube in his way.

The disposition of the uterus following salpingectomy where it is desirable to preserve menstruation. In this paper, which is based upon the consideration of over 500 cases, the author has limited himself to a discussion as to the best method of disposing of the uterus in those cases in which the tubes have been removed and where it is possible to preserve some ovarian tissue. The probability of menorrhagia and the fear of retroversion have led him to adopt utriculoplasty as the operation of choice when double salpingectomy has been performed. To avoid adhesions the round and broad ligaments are sewn over the top of the uterine stump.

Management of abortion from a study of 530 consecutive cases. The opinions expressed in this paper are drawn from a careful study of over 500 cases admitted to the Bellevue Hospital during a period of thirteen months. The treatment has been primarily conservative. In aseptic cases any products of gestation actually presenting at the cervix or in the vagina are removed by sponge forceps. The vagina is packed only if there is much bleeding. All cases of inevitable or incomplete abortion, whether they require packing or not, are given $\frac{1}{2}$ cc. of pituitrin every two hours for four doses. The packing is done in the lithotomy position and without an anæsthetic. It is removed in from 12 to 24 hours, and in only a few cases has it to be repeated. If bleeding continues in spite of three packings, curettage may be indicated. All cases of abortion are instructed to lie upon the abdomen for at least eight hours in the twenty-hour.

In none of the septic cases are any intrauterine manipulations or irrigations permitted for fear of spreading the infection. Septic abortions are placed in the open air in the Fowler position, and feeding is forced as much as possible. Some cases are given repeated small blood transfusions, others salvarsan, and others sera and vaccines. Gordon can see that in regard to these points individual opinions may vary, but he can see no reason for variations of opinion as between radical and conservative treatments. He expresses no opinion in regard to the value or otherwise of sera and vaccines.

The following conclusions are drawn from the data supplied by this series of cases :—

(1) All cases of abortion should be treated conservatively until it is demonstrated that such treatment has failed. This will occur in about 4 per cent. of cases.

(2) The mortality and morbidity in cases of abortion is in direct ratio to the degree of intrauterine interference; and curettage transposes many clean cases into the septic category.

(3) Conservative treatment has, if possible, a more positive indication in septic than in aseptic cases.

Concerning torsion of the uterine adnexa occurring before puberty, together with a consideration of torsion of normal adnexa. Report of a case and a review of the literature since 1900. The authors report the case of a child, aged nine years, who was admitted to hospital complaining of abdominal pain and vomiting of four days' duration. Physical examination showed a raised temperature and pulse rate; the abdomen was very slightly, if at all, distended, but there was well defined tenderness in the right lower quadrant. On rectal examination a swelling could be felt to the right side. The abdomen was opened on a diagnosis of "appendicitis," but the right appendages were found to have undergone torsion. The ovarian structure was lost owing to the hæmorrhage, but one small cyst was present whose nature could not be determined, but which resembled an ordinary follicular cyst. The tube was infiltrated with blood and inflammatory cells.

Short accounts are given of 250 other cases of adnexal torsion occurring before puberty. From a review of these cases it appears that torsion of ovarian tumours before puberty is uncommon, and that a large proportion of them are dermoids. The symptoms are similar to those of torsion of the appendages in adults.

Smith and Butler were led to inquire whether torsion of normal appendages could occur, and they have been able to collect fourteen cases in which this accident has overtaken normal appendages, and a short resumé of each is given. From a review of the cases the following data are extracted :—

Eight of the fourteen occurred before the age of twenty and four were under twelve. The two oldest patients were 46 years of age. In five cases the tube alone, and in nine cases the tube and ovary were involved. The torsion took place on the right side ten times and on the left four. The symptoms were the usual ones of torsion. Half the patients had had previous attacks attributed to incomplete torsion. W. W. KING.

Surgery, Gynæcology and Obstetrics.

September, 1921.

*Interstitial tubal pregnancy : a report of two cases. S. DI PALMA.

*The two-flap low incision Cæsarean section; an operation applicable after an efficient test of labour. ALFRED C. BECK.

*Dangerous intraperitoneal hæmorrhage from uterine fibroid. J. LOUIS RANSOHOFF and M. DREYFOOS.

*The surgical treatment of acute pelvic infections in women. F. G. Du Bose.

The treatment of gonorrhœa in the lower genito-urinary tract in women. Charles C. Norris.

Interstitial tubal pregnancy: a report of two cases. Case 1, aged 29, ii-para; admitted July 20, 1920. The right tube had been removed in July 1919, for chronic salpingitis; about six months prior to admission she was curetted for a three months' incomplete abortion. The last menstrual period was May 27, 1920; sexual intercourse followed ten days later. The present illness began five hours before admission with cramp in the abdomen and vomiting, and the patient became pale and weak. Immediate laparotomy revealed a large amount of blood in the abdomen, a normal left tube, follicular cysts in each ovary, and multiple small fibroids in a slightly enlarged body of the uterus. On the fundus, 1 cm. from the tube-entrance, was found a circular rupture (3.5 cm. in diam.), oozing freely. The left cornu and tube were removed; the embryo was not found. The microscopic section through the cornu at site of rupture showed typical chorionic villi. The patient was discharged cured on the 16th day.

Case 2. M. B., aged 32, vii-para; admitted October 16th, 1920. All previous labours had been difficult and in several instances complicated by fever. The last pregnancy was a six weeks' abortion, not followed by curetting. The menstrual period was two weeks overdue on admission. The present illness began the day before admission with cramp in the lower abdomen, most marked in left lower quadrant, accompanied by vomiting and increasing shock.

On laparotomy the peritoneum was filled with blood and clot; there was a small oozing rupture in the upper surface of the left cornu of a slightly enlarged uterus. The appendages were healthy, with the exception of a follicular cyst in the right ovary. The left cornu and appendages were removed; the embryo was not found. The patient died on the eighth day of sepsis (hæmolytic streptococcus isolated in blood culture). At necropsy there was no peritonitis and no hæmorrhage.

The microscopic section through the rupture in the cornu showed decidual cells, syncytial cells, typical chorionic villi and a moderate amount of hæmorrhage.

A short discussion with regard to ætiology follows the reports.

The two-flap low incision Cæsarean section: an operation applicable after an efficient test of labour. Beck states that, owing to the high maternal mortality following the classical Cæsarean section undertaken late in labour, subsequent to rupture of the membranes and vaginal examination, most operators are unwilling to attempt suprapubic delivery after an efficient test of labour. In one series of cases over ten per cent. of patients operated upon after a test of labour died of peritonitis. Death occurred about the eighth day, in the course of a puerperal infection; necropsy showed either a stitch abscess in the uterus or a broken-down uterine wound, through which infected material escaped into the abdominal cavity. The technique described for the operation is the lower segment technique with the additional modification that a definite upper and lower peritoneal flap is made, and these are made to overlap after the vertical uterine incision has been sutured. Charts and tables are given of twenty-five cases in which the

technique was followed; only eight showed any signs of infection during the puerperium and all the patients recovered.

The surgical treatment of acute pelvic infections in women. It is estimated that 75 per cent. of invalidism in women arises from pelvic infection. Women suffer from pelvic and abdominal pains, back-ache, disorders of menstruation, constipation and its consequent toxæmia, reflex digestive disorders, and all grades of neurasthenia, and the expression of focal infection in every form; cardiac, vascular, renal, and arthritic.

At intervals there are acute exacerbations of the pelvic infection, requiring a prolonged course of expectant treatment, and during the treatment there is an ever extending pathological destruction which causes death or confirmed invalidism. It is especially with regard to these acute exacerbations and the primary attacks that the author urges early and more radical treatment. Recurrence of pelvic abscess after vaginal drainage has been the rule, and operation at a later date discovers the pelvic mass with its pockets of so-called sterile pus, the vaginal drainage having probably reached only one pocket of pus.

However much the posterior fornix bulges with pus the author now operates through an abdominal incision, so that all diseased tissues may be examined and surgically treated.

The author believes that the greatest error in the treatment of these cases is insufficient surgery and inadequate drainage, and states that a review of the literature on the subject during the last decade is convincing that the mortality and morbidity, following the non-operative, the expectant or conservative surgical treatment is frightful indeed.

Immediate operation is done in all cases which present the syndrome of " acute surgical pelvis " if seen within the first twelve hours of the onset of the infection, which is ushered in by sudden, severe abdominal pain, nausea, vomiting, chill, high temperature, irritable bladder, urethral pain, constipation, abdominal rigidity and tenderness, all progressive, uninterrupted, and accompanied by a definite leucocytosis. If seen after twelve hours, a variable period of observation is followed, during which absolute rest is given, as far as is compatible with repeated examinations. A blood count is done, and a bacteriological examination is made. As a rule the bacteria of genital origin are the streptococcus and the gonococcus; of intra-abdominal origin, the streptococcus and the colon bacillus.

The routine examinations are minute and include X-ray and cystoscopy. When seen before the eighth day operation is deferred on certain conditions :—(1) If the condition is stationary or takes a favourable turn during the first twelve hours of observation. (2) When the blood examination reveals a high polymorphonuclear count without an accompanying leucocytosis. (3) From the third to the seventh day when the peritonitis is at its height and the rest method is being given a chance to have effect, as evidenced by improvement in the symptoms.

Operation is not deferred :—(1) When unfavourable symptoms become exaggerated during the first period of observation. (2) When there is sudden relief of pain accompanied by a subjective sense of improvement, an acceleration of pulse-rate and a lowering of temperature. (3) When there is a sudden fall in a previously high leucocyte count accompanied by an increasing percentage of polymorphonuclears. (4) When more than a week has elapsed since the onset of the infection; because in all probability the

blood will have developed, during this period, a degree of immunity to the limit of its opsonic power. (5) When a mass appears in the pelvis—evidence of the localization of the infection by adhesions within a circumscribed area.

The operative treatment consists of the separation and removal of all infected tissues, with the establishment of wide drainage for at least seven days.

A table of 163 cases, whose post-operative course was followed, is attached to the report. A. C. PALMER.

Tuberculous salpingitis: a clinical study of 200 cases from the Gynæcological Clinic of the Johns Hopkins Hospital. J. P. GREENBERG (*The Johns Hopkins Hospital Reports,* Vol. xxi, Fasc. 11, 1921). Dr. Greenberg summarizes his conclusions in his very complete monograph of 200 cases of tuberculous salpingitis as follows :—

1. Tuberculous salpingitis occurred in nearly 1 per cent. of all women admitted to the gynæcological service of The Johns Hopkins Hospital.

2. It was found one and a half times as frequently among the coloured as among the white women.

3. Out of every 13 abnormal tubes removed at operation, 1 was tuberculous.

4. Nearly three-fourths of the patients were between 20 and 40 years of age.

5. Sixty per cent. of the married patients were sterile.

6. A family history of tuberculosis was reported in 22.5 per cent., while in an additional 2.5 per cent. the consort had active pulmonary tuberculosis.

7. The chief complaint of the patient was pain (74.5 per cent.), usually situated in the lower abdomen (82.5 per cent.).

8. Not much information was obtained from the menstrual history. However, 62 per cent. had dysmenorrhœa, and 41.5 per cent. had menorrhagia. Amenorrhœa occurred in only 6.5 per cent. of the patients.

9. Leukorrhœa occurred in 72 per cent. of the cases.

10. Nearly half of the patients had dysuria, nycturia and pollakiuria.

11. More than half of the patients were constipated.

12. Approximately one-fourth of the patients attributed the onset of their symptoms to some uterine activity (menstruation, pregnancy, etc.).

13. Half of the patients had lost weight during their illness.

14. The physical examination presented no characteristic findings.

15. About one-fourth of the patients had pulmonary tuberculosis.

16. Pre-operative elevation of temperature was recorded in 62.5 per cent.

17. There was usually either an absolute or a relative leukopenia.

18. Half of the patients examined had a hæmoglobin deficit.

19. The correct diagnosis before operation was made in only 13 per cent. of the cases and in more than half of these the diagnosis was aided by the presence of ascites.

20. A radical operation was performed in 53 per cent. of the cases.

21. Complications during operation occurred in 14.5 per cent. of the patients.

22. Among our cases 104 were drained; of these, 17.3 per cent. developed fæcal fistulæ. Abdominal fæcal fistulæ occurred three times more fre-

quently among the cases drained abdominally than in those drained through the vagina.

23. Of the 96 patients not drained at all, not one developed a fæcal fistula.

24. In one-third of all the patients there was suppuration of the abdominal incision.

25. In the series, 7 per cent. developed abdominal fæcal fistulæ and 2 per cent. had vaginal fæcal fistulæ. The incidence of fæcal fistulæ among the cases in which the bowel had been injured was 48 per cent., whereas among the cases in which the intestines had remained intact the incidence was only 3.4 per cent. The patients with pre-operative fever developed fæcal fistulæ more than twice as frequently as those without fever.

26. Urinary fistulæ occurred five times (2.5 per cent.).

27. In more than one-third of the patients the convalescence was not uneventful.

28. About 60 per cent. of the patients left the hospital within a month, while more than 90 per cent. were discharged before the end of two months.

29. The order in frequency of the involved pelvic organs was as follows: tubes, uterus, ovaries, cervix and vagina. These organs were found associated with tubal tuberculosis as follows: uterus, 72.6 per cent.; ovaries, 33 per cent.; cervix, 3.5 per cent.; and vagina, 0.5 per cent.

30. In 99 per cent. of the cases both tubes were involved.

31. In 68 per cent. of the patients the peritoneum was found involved and in 3 per cent. the appendix was found to be tuberculous.

32. In 17 per cent. of the cases, myomata uteri were associated with the tuberculous process.

33. In only 2 per cent. was there an associated involvement of the urinary tract.

34. The prognosis is grave in the presence of tuberculosis elsewhere in the body, when fever exists and when the peritoneum is involved.

35. Our operative mortality was 7.6 per cent. (This includes all the patients who died in the hospital.)

36. By means of "follow-up letters," etc., 90 patients were traced and out of this number 78 were found to be living from 2 months to 30 years after the operation. Nearly all those who are alive are in good health.

There was also in the gynæcological service a case of tuberculosis of the clitoris in which tubercle bacilli were demonstrated. No abdominal operation was performed, hence it is not known whether the patient had a concomitant tuberculous involvement of the pelvic organs.

The bibliography contains 223 references.

Bulletin de la Soc. d'Obstétrique et de Gynécologie de Paris et et des Sociétés et Réunions Obstétricales, &c.

1920, No. 6, and 1921, No. 5.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF PARIS.

Meeting on 13th December, 1920.

Syphilitic placenta and phagocystosis of the spirochætæ. M. MANOUELIAN.

Spirochæta pallida and phlebitis of the umbilical vein. M. MANOUELIAN.

*On the prognosis in cases of hæmorrhage complicating pregnancy. MM. WALLICH, ABRAMI, and LEVY-SOLAL.

Case of Cæsarean section for placenta prævia. M. BRINDEAU.
*Ectopic gestation : ruptured tube : twins. M. PHELIP.
Concerning paper by M. Chérie : "Pelvic radiography with Mazo's Antidiffuser." M. BOUCHACOURT.
*Treatment of puerperal infection by the antistrep. lipo-vaccines. MM. LEQUEUX, LAFFONT, and CHOME.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF BORDEAUX.

Meeting on 20th July, 1920.

Two emergency Cæsarean sections for contracted pelvis in cases of patients having erysipelas of the face. MM. PERY and BALARD.
Sternophagus Monster. M. BALARD.

Meeting on 23rd November, 1920.

Paralysis of the foot after confinement. M. ANDERODIAS.
Case of pernicious vomiting due to pregnancy. M. PERY.
*Acute dilatation of the stomach in the new-born. MM. PERY and BALARD.

Meeting on 14th December, 1920.

Eclamptic convulsions after Cæsarean operation. M. ANDERODIAS.
Congenital constrictions and amputations by amniotic adhesions. MM. PERY and FAVREAU.
Three cases of pseudo-rheumatism in the puerperium. MM. PERY and BOUSIER.

Meeting on 28th December, 1920.

Puerperal thrombosis of the vagina, subsequently infected. MM. CHARBONNEL and FAVREAU.
*Cancer of the body after radiotherapy for fibroma. M. BEGOUIN.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF LILLE.

Meeting on 21st April, 1920.

Uterine fibroma during pregnancy, involving the fundus of the uterus : abdominal hysterectomy at the third month. I. J. VANVERTS.
Simultaneous expulsion of fœtus and placenta : three cases. M. VANVERTS.
Pernicious anæmia and pregnancy. M. PAQUET.
Pelvic peritonitis following abortion. M. PAUCOT.

Meeting on 23rd December, 1920.

General peritonitis from rupture of a pyosalpinx on the right side. Operation and recovery. M. DELAPINE.
Treatment of pregnant women who have had Cæsarean section. M. VANVERTS.
Myomectomy at the fourth month of pregnancy. Accouchement at term. M. PAUCOT.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF LYONS.

Meeting on 9th July, 1920.

Confinement in the case of a patient who in a previous pregnancy had premature separation of the placenta. MM. FABRE and RHENTER.
Case of acute dilatation of the stomach. MM. FABRE and RHENTER.
Case of eclampsia, rapidly proving fatal. MM. GOURET and VORON.
Five cases of congenital oblique oval pelvis. MM. FABRE and BOUGET.

Pancreatic syphilis of the new-born. MM. COMMANDEUR and BOUGET.
Two cases of syphilis in newborn infants treated by intravenous injections of arseno-benzol. MM. VORON and PALIARD.
A case of fœtal jaundice. M. GUILLERMIN.
Cæsarean section and hysterectomy at term for painful fibroids. MM. FABRE and BARBIER.
Case of rupture of the uterus during pregnancy. MM. TRILLAT and EMERY.

Meeting on 3rd December, 1920.

Central placenta prævia. M. PLAUCHU.
Spontaneous delivery in a case of fibroma prævia. MM. VORON and RHENTER.
*Treatment of puerperal endometritis by Carrel's method. M. TRILLAT.
Separation of normally situated placenta. M. RHENTER.
Ovarian cyst and Cæsarean section. M. PLAUCHU.

Meeting on 17th December, 1920.

Induced premature labour in the case of a woman who had previously had Cæsarean section. M. COMMANDEUR.
Fracture of parietal bone in the course of extraction of the after-coming head. MM. VORON and DELORME.
Two cases of vaginal thrombosis. MM. FABRE and RHENTER.
Spontaneous labour in the case of an ovarian cyst presenting. MM. VORON and BOUGET.
Intermittent streptococcal growth in the case of a fatal puerperal septicæmia. MM. FABRE and EPARVIER.
A case of paroxysmal tachycardia following confinement. MM. FABRE and GAUCHERAND.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF MONTPELLIER.

Meeting on 8th December, 1920.

Uterine fibroids with red degeneration in the case of a young woman. M. TEDENAT.
A case of encephalitis lethargica during pregnancy, with recovery and continuation of the pregnancy. MM. GAUJOUX and FLAISSIER.
Carcinoma of the cervix with cyst on the broad ligament, mistaken for extension of the growth. M. DE ROUVILLE.
*Blood transfusion in the treatment of puerperal infection. M. PAUL DELMAS.
Another slight case of tetanus. MM. GAUJOUX and FLAISSIER.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF NANCY.

Meeting on 30th June, 1920.

Congenital tumour of the ovary in a young girl. MM. FRAELICH and MATHIEU.
A case of vesico-vaginal fistula. MM. BINET and GRANDINEAU.
Torsion of an ovarian cyst during pregnancy. M. HAMENT.

Meeting on 17th November, 1920.

Fibroids in pregnancy. M. VAUTRIN.
Large fibroids and pregnancy. M. FRUHINSHOLZ.
Small fibroids and Pregnancy. M. VERMELIN.
A case of lithopedion. M. VAUTRIN.

Meeting on 15th December, 1920.

Some observations on the torsion of ovarian cysts in the course of pregnancy. MM. HAMENT and VERMELIN.

Observations of fibroids and pregnancy. MM. FRUHINSHOLZ and G. MICHEL.

Chorionepithelioma. MM. VAUTRIN nnd FRUHINSHOLZ.

Treatment by serum in a case of suppurative mastitis. MM. BINET and REMY.

Hæmatoma and spontaneous rupture of the cord. MM. VERMELIN and MORLOT.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF TOULOUSE.

Meeting on 12th November, 1920.

Pyometra. MM. DIEULAFE and MERIEL.

Molar pregnancy : induced abortion ; followed by deciduoma : hysterectomy : report on the lutein cyst and on the mole. M. GILLES.

Cyst of the ovary during pregnancy : ovariotomy at the third month. M. TOURNEUX.

Cervical cancer : fœtal necrosis : Cæsarean section, followed by subtotal hysterectomy. Recovery. MM. AUDEBERT and FOURNIER.

Sarcoma of the humerus in the course of pregnancy. M. DIEULAFE.

Case of pyelonephritis during pregnancy : difficulty of diagnosis. M. GARIPUY.

Retroplacental hæmorrhage due to hysteropexy and trauma. M. AUDEBERT.

Injections of milk in the case of babies with gastric intolerance. M. AZEMA.

Meeting on 17th December, 1920.

Two recent observations of subacute dilatation of the stomach following Cæsarean section. M. AUDEBERT.

Tubal pregnancy : retention of fœtus : subtotal hysterectomy. Recovery. M. TOURNEUX.

A case of pyelonephritis during puerperium, treated by injection of salts of tin. M. GARIPUY.

Incomplete rupture of the cord and hæmorrhage. M. AUDEBERT.

Cord many times round neck of fœtus, with fatal result. M. AUDEBERT.

Ovarian cyst in pregnancy. M. DAMBRIN.

Treatment by fixation abscess, especially in cases of abortion suspected of being septic. MM. AUDEBERT and FOURNIER.

Meeting on 24th March, 1921.

Obstruction by ovarian cyst : ovariotomy following labour. MM. GILLES and GAY.

A case of facial paralysis, present for a long time after application of forceps. M. GARIPUY.

Two cases of uterine inertia ; extraction of fœtus by means of Farabeuf's key. M. TOURNEUX.

Ethmoidal Sinusitis, generalised œdema of the orbit, and meningitis in the new-born. MM. AUDEBERT and STILL-MURKES.

Meeting on 26th May, 1921.

Pernicious vomiting : induced abortion : recovery. M. LAURENTIE.

Retroplacental hæmorrhage of traumatic origin. MM. AUDEBERT and CLAVERIE.

Meeting on 23rd June, 1921.

Phlebitis in a case of influenza during the puerperium. M. AUDEBERT.
Polycystic degeneration of the ovaries. M. LAURENTIE.
Central placental prævia. M. LAURENTIE.

Meeting on 24th November, 1921.

Difficult labour due to presenting fibroid : prolapse of cord : hysterectomy. M. LAURENTIE.
Inundation of peritoneum by repeated rupture of tubal pregnancy. Two twin pregnancies previously, one intra- and the other extra-uterine : laparotomy : acute dilatation of the stomach : recovery. M. LAURENTIE.
Chorea and pregnancy. M. AUDEBERT.
*Cervical cancer treated by Curietherapy in spite of periuterine infection. M. GARIPUY.
Bilateral intraligamentary cyst of the ovary : subtotal hysterectomy. MM. DANEBRIN and BERNARD BEIG.
Obstetrical shock and acute dilatation of the stomach immediately after prolonged labour. M. FOURNIER.

Prognosis in cases of hæmorrhage occurring during pregnancy The prognosis in such cases is of the greatest importance, and full of difficulty. The question often arises is it safe to allow pregnancy to continue? How will the patient stand the operation for terminating pregnancy? In 1913, MM. V. Wallich and P. Abrami undertook to investigate this matter, and the authors now claim to have drawn up a scale by which the prognosis is made easier. They describe three degrees of anæmia.

First Degree, in which the number of corpuscles is markedly diminished, the shape of the corpuscles very little affected, and no " polycromatophilia." In these cases recovery will be easy, and there is no anxiety.

Second Degree, in which the diminution in the number of corpuscles is less marked, but certain changes are present in the shape of the corpuscles.

In the Third Degree are classed those cases where in addition to poikilocytosis, myelocytes and nucleated red cells are found. All this is evidence of a great effort being made by the medulla to replace the loss of blood, and the prognosis is correspondingly more serious.

In addition to the other examinations, the authors have in a number of cases taken the coagulation time of the blood. This want of coagulability of the blood is, in the authors' view, a frequent cause of uterine hæmorrhages—perhaps more often than mechanical and other local causes. A case of threatened miscarriage, in which the authors were able to give an exact prognosis, and order appropriate treatment, is then quoted.

Ectopic gestation; ruptured tube: twins. J. A. Phélip records the following interesting note on a ruptured tubal pregnancy in a case of twins. Patient was aged 23, the mother of one child born in January 1920. On the 10th March the patient had a period lasting eight days. This was followed by amenorrhœa and morning vomiting. On July 9th the patient was at work when she experienced very violent pain in the abdomen and thorax, giving rise to painful inspiration and vomiting. The patient was examined by a doctor, who reported vaginal hæmorrhage and remains of decidua. On admission to the hospital, the patient had marked dyspnœa, pulse 120

Abdomen very tender and rigid, a body like a uterus three months pregnant was felt above the pubes. Vaginal examination confirmed the diagnosis of a uterus three months pregnant, in addition to a ruptured tubal gestation. A laparotomy was immediately performed, and two fœtuses were discovered in the peritoneal cavity, amongst a mass of blood clot. The rupture had occurred about the interstitial portion of the tube. The rupture extended into the uterus, and this wound was sutured. The patient was young, and a hysterectomy was not considered necessary.

Puerperal infection treated by lipo-vaccines. The vaccine consists of 2 milligrammes of organisms (*i.e.*, about 4½ milliards) killed by heat and suspended in 2 cubic centimetres of mixed vegetable oil. The streptococci were taken from four sources, one a case of erysipelas, two cases of suppuration, and one of puerperal septicæmia. The advantage of the lipo-vaccine is the fact that the organisms have not undergone autolysis, and are absorbed slowly, so that a large dose can be injected without producing much reaction. The doses given have been 0.5 cc., 1 cc., then 2 cc., injected into the outer surface of the thigh. Local reaction with formation of induration, which lasts about three or four weeks, often follows. General reaction is usually slight, such as a feeling of fatigue, slight elevation of temperature for 24 hours. As a rule, 6 to 10 injections are given. The authors have treated 62 cases which may be classified under three headings, according to their severity. Out of 14 very severe cases, four were cured, and ten died.

The authors then give comparative tables of the use of Lipo-vaccines as a prophylaxis. These figures show very definitely that streptococcal infection is more rare in the vaccinated than in the cases not so treated.

Acute dilatation of the stomach in a new-born infant. The following case was reported on account of its rarity. A male child, weighing 3¼ kilo., was born on October 12th. Cephalic presentation, normal confinement. The infant cried as soon as it was born, and did not appear to have any abnormality. There was no abnormal history on the maternal or paternal side. On the 13th (*i.e.*, twenty-four hours after birth), the infant was put to the breasts and suckled normally. The breast feeds were given every three hours. The same day, 36 hours after the confinement, he commenced to vomit three-quarters of an hour after the last feed. The vomiting was of an explosive character, and occurred repeatedly. At first the vomit was purely gastric, but soon became greenish, and then, two days later became fæcal. At length the infant would not suck, and it became necessary to feed him with a spoon. The general aspect became very changed, pale, feeble, and the abdomen somewhat ballooned. Meconium was passed, but the stools never showed a normal yellow, and the quantity passed rapidly decreased.

The child was treated by serum, camphor oil, adrenalin, and the stomach was washed out. This was done with great difficulty, because of the abundant thick, glassy, mucous secretion. Eventually, on the 18th day, the child died. Post-mortem examination showed the stomach and duodenum very much distended, as far as the point where the superior mesenteric artery passes across the third part of the duodenum. The authors quote a somewhat similar case from the American literature, where the condition was not so acute, and where a gastro-enterostomy was performed successfully.

Cancer of the uterine body after radiotherapy for fibromyoma. M. Bégouin discusses the above problem, and says it will be remembered that in 1919 Professor Delbet reported at the Society of Surgeons three operations in which treatment by radiotherapy for fibromyoma was followed by cancer, which developed very rapidly. M. Delbet asked if X-rays had caused the cancer, or if, at any rate, it had not been the cause of its rapid development, leading to the death of the patient $2\frac{1}{2}$ months later?

One case, aged 54, was operated upon in May 1918, for cancer of the body. This patient had been treated by X-rays for a large fibromyoma, from which she had suffered for the past ten years. After five seasons at Salies des Bains, the patient asked for radiotherapy, as her condition had not improved; and in 1911 Professor Bergouié gave her six treatments at monthly intervals. The menorrhagia ceased, and at the same time the menopause definitely followed; but the fibroid did not appreciably diminish. In 1917, six years after treatment by radiotherapy, and establishment of the menopause, irregular hæmorrhage occurred. The patient again was treated by radiotherapy, but six treatments had no effect. Hysterectomy was then performed, and the condition found to be columnar cell carcinoma of the body.

The author points out that, since the cancer did not appear for six years after the treatment by X-rays, it is impossible in this case to connect the two. Further, the author quotes M. Béclère as saying that, out of 400 cases of fibroids treated by radiotherapy he did not find one case of carcinoma. The practical conclusion of this discussion appears to him to be, that where the diagnosis of an uncomplicated fibroid is in doubt, radiotherapy is contra-indicated, and that operation should be advised.

Treatment of puerperal endometritis by Carrel's method. M. Trillat points out that the numerous local treatments for puerperal sepsis which from time to time have been evolved have wholly been abandoned. There are few people who defend the practice of continuous irrigation, curettage, and systematic cleansing of the endometrium. The Lyons School, which had always been hostile to these methods, remained more or less faithful to the treatment by intrauterine injections, especially in cases where the temperature reached 39° C., where the pulse is 120—130, and there is no sign of generalized infection. These injections, however, were not without their disadvantages. It was fairly common to notice, a few hours later, a rigor, and a rise of temperature to 40°—41° C. It was to remedy these defects, and the poor results, that they have tried to use the Carrel method of irrigation, and the good results obtained urge them to describe the technique employed. At first, a drain was used, consisting of a modified Plauchu tube. This tube was made of rubber, doubled on itself, the limbs being both the same length, and joined to one another. To facilitate the introduction of the fluid one limb is now made longer than the other. This limb is not perforated, and is fixed to the thigh by plaster. A further modification has been made, so that the tube is more easily kept in the uterine cavity. The method of introducing the fluid is very simple. Every two or three hours 20 or 30 cc. is introduced into the tube. Twice a day, the patient is placed on a bed-pan, and the dressing changed. They allow the tube to remain in place three to six days, according to the temperature and to the general state of the patient. The author states he has used this method in a dozen cases, with invariable success.

Blood transfusion in the treatment of puerperal infection. M. Paul Delmas points out that the experience of the War standardized the technique of transfusion, and the indications in cases of hæmorrhage are well known; but some authors state that this treatment is contra-indicated in cases of infection. They, however, do not give their reasons. Jeanbrau, in an article in the *Presse Médicale*, 4th Feb. 1918, tells us that in certain cases of septicæmia, associated with severe anæmia, the transfusion was of pronounced benefit. Similar conclusions have been come to by Combier, Murard and Graham in the *Edinburgh Medical Journal*, Feb. 1920. It is easier to interpret these facts as due to the stimulation of the bone marrow and other blood-forming organs, rather than to the effect of the actual blood transfused. It is still more efficacious if the blood is taken from a patient who has suffered from the same disease. The blood of the donor then contains antibodies, and gives passive immunization. H. J. B. Fry reports several such cases in the *Brit. Med. Journ.*, 28th Feb. 1920. One woman under the author's observation, aged 26, had had an abnormal labour, with post-partum hæmorrhage, and a severe infection. Intrauterine injections, colloid metals, fixation abscesses, had all followed. Called in on the 12th day, the author treated the patient by a transfusion of 300 cc. of blood. As soon as the next day the pulse and temperature had diminished; at the end of a week the temperature had definitely subsided. The author quotes three other cases, but realizes that no definite conclusion can be come to on such scanty evidence.

Chorea and pregnancy. M. Audebert reports a case of chorea which appeared in infancy, and was greatly increased later under the influence of pregnancy. The patient, aged 37, had suffered from the age of 6½. The history of the parents was normal, but the patient was uncertain as to the cause of the deaths of her brothers and sisters. She had been perfectly well until she was 6½ years of age, had never had measles, scarlet fever, or diphtheria, and no tendency to any nervous disease. She stated that at 6½, when at school, she had a serious fall, and later the left knee became swollen. Further, she noticed that the left side of her body became weak; but her story was somewhat vague. A few months later, abnormal movements appeared, limited at first to the left side, but after two or three months they became general. She was treated by bromides, etc. From the age of seven until the present the patient never ceased to have choreic movements, but their intensity varied greatly. When she was alone and quiet the movements were scarcely noticeable, but a noise or any emotion caused the marked gesticulations and grimaces. She slept well, with complete cessation of the movements. When she was 20 years of age the movements became so bad that she could not leave her bed for six months, and she scarcely slept at all. She had to be fed, and had difficulty in speaking. This exacerbation reappeared at the first pregnancy nine years ago. The agitation was exaggerated as soon as the menses stopped, and did not diminish until two or three months after delivery. The child was absolutely normal, and did not exhibit nervous symptoms. The same thing was repeated in 1918, when the patient again became pregnant.

Cervical cancer treated by curietherapy despite periuterine infection. M. Garipuy, who had treated 60 patients by local application of mesothorium, was not prepared to draw any conclusions, as the time elapsed was insufficient for

making any serious contribution on the question of prognosis. However, he made an important observation on the matter of technique. The patient of whom he spoke entered the hospital under M. Dambrin suffering from advanced carcinoma of the cervix. She was 27 years of age. The patient had been diagnosed as syphilitic, and proper treatment tried. Soon after, however, she was admitted to hospital. The Wassermann reaction was found to be negative, and the diagnosis of carcinoma of the cervix was made. The mother of the patient was reported to have died at the age of 55 from a tumour of the liver. The first sign that actually appeared was small hæmorrhages which followed the slightest touch on the cervix. It was owing to two severe hæmorrhages in the course of her syphilitic treatment that she came into hospital. On examination, a large hard mass was found between the two lips of the cervix. The uterus was immobile, and severe hæmorrhage followed the examination. The condition was considered inoperable, and curettage was performed together with cauterization a few days after the patient was admitted to hospital. This curettage was followed by very marked febrile reaction, and by severe inflammation of the peritoneum and appendages. All radiotherapy, of course, was put off, and the patient, after three weeks' rest with ice on the abdomen, was well enough to leave the hospital. She returned three months later, and examination showed the existence of a large inflammatory mass in the left iliac fossa. Realizing, however, the impossibility of any other treatment, the author decided to apply mesothorium, in spite of the inflammatory lesion. He took the precaution, however, to keep ice on the abdomen of the patient for 24 hours before and during the two days of the application. He was able to put 150 milligrammes of mesothorium bromide in the cervix. This mesothorium was in three tubes, which had filters consisting of 0.3 mm. of platinum and 1 mm. of lead, covered by rubber. After 44 hours, the patient complained of some nausea, and the treatment was therefore discontinued. A month afterwards no febrile symptoms had appeared. On examination the inflammatory mass appeared the same. Although the author is in entire agreement that as a rule periuterine infection is a contra-indication of Curietherapy, he nevertheless considers that in certain cases, such as has been recorded, if the above precautions are taken, it is justifiable to apply mesothorium. M. DONALDSON.

Gynécologie et Obstétrique. (Révue mensuelle.)

No. 6, 1921.

*The treatment of carcinoma of the cervix by combined X-rays and radium. S. RECASENS.

The termination of the aorta in women. A. MAURER and L. PORTES.

A clinical and histological study of the umbilical vein in syphilis. V. MANOUELIAN.

*Rupture of veins of fibroids into the peritoneal cavity. ANDRE CHALIER. and L. MORENAS.

The treatment of carcinoma of the cervix by combined X-rays and radium. At Lyons in 1914 the author pointed out that in order to increase the activity of radium it would be useful to combine this with X-rays: he had noticed that glands removed, whilst performing a Wertheim for carcinoma of the

cervix, were nearly always invaded with cancerous elements, not only in those cases where the parametrium was already involved, but also in cases in an early stage where the growth appeared localized. The results obtained by the combined method were considerably better than those in which radium alone had been used, as the deeper tissues can be acted upon, yet great care must be taken that the dosage is not too large; the treatment is based upon acquired experience. The radium is placed in the midst of the cancerous tissue, and the X-rays applied to the abdomen assist by acting upon the parametrium and glands; in this way it is now possible to treat cases which, had they been seen before, would have been considered beyond treatment by radium alone.

The author thinks that with this treatment his figure of 25 per cent. success (after five years) may be considerably improved, especially in the case of carcinomata whose extensive lesions render inefficient the action of radium alone.

Rupture of varicose veins on the surface of fibroids. Although in so many cases it is the rupture of an ectopic pregnancy which produces severe hæmorrhage, filling the peritoneal cavity, yet it is very important to remember that there are other conditions which may produce such an hæmorrhage and it is important to eliminate these; one condition which has been repeatedly pointed out by various authors is the rupture of a varicose vein on the surface of a fibroid.

In a series of five cases, it was noticed that the tumour was always large, and the pressure exerted by this mass in the pelvis produced more or less œdema of the peritoneum; the distended walls of the veins soon lose their elasticity and at the same time are subject to great changes in pressure from various causes, such as repeated slight knocks and also from the weight of the tumour. The history is usually the same, that a woman approaching the menopause is suddenly seized with abdominal pain and faintness. In two cases of the series there were evidently two hæmorrhages, one following twenty-four hours after the first, and in the other case after an interval of three weeks. The physical signs point to the abdomen, whilst the pallor, pulse and thirst indicate hæmorrhage. Laparotomy, allowing one to find the bleeding points, followed by hysterectomy, ends in rapid recovery where the clinical picture promised a somewhat pessimistic prognosis. F. H. LACEY.

Zentralblatt f. Gynäkologie.

No. 28, *July 16th*, 1921.

*Anatomical investigations on facial paralysis in the new-born. H. ROSSENBECK.

*The duration of pregnancy. P. W. SIEGEL.

The origin of hydrops gravidarum. M. BECKMAN.

*Supernumary and accessory ovaries and their tumours. B. LIEGNER.

No. 29, *July 23rd*, 1921.

Radiology of the alimentary canal in the new-born with cyto-barium. E. VOGT.

Delivery of the after-coming head in dead children. W. SIGWART.

On the cause of face presentations in acranius. AMREICH.

*A further contribution to the relationship between asphyxial and difficult labours and subsequent psychic and nervous disturbances. W. HANNES.

A modification of the Jascke-Scherbak milk pump. F. KERMAUNER.

No. 30, *July 30th*, 1921.

Extravesical implantation of a single ureter. R. MEYER.

*On gonorrhœal cystitis. G. LINZENMEIER.

*On pyelocystitis in the new-born. R. HORNUNG.

On the applicability of the Goebell-Stoeckel operation. M. LINKENBACH.

Anatomical investigations on facial paralysis in the new-born Rossenbeck controverts the view usually held that facial paralysis in the new-born is invariably due to trauma during delivery, either from the pressure of forceps or in contracted pelvis with spontaneous labour. Careful dissections have shown that the facial nerve in the new-born child from its exit at the stylo-mastoid foramen to its entry into the parotid gland, where it splits up into branches, is deeply embedded in dense fatty connective tissue and is protected by the overlying anterior border of the sterno-mastoid muscle. He therefore arrives at the important practical conclusion that facial paralysis in the new-born cannot always be avoided even when the most careful technique is employed.

The duration of human pregnancy. War conditions and the exigencies of military leave attendant thereon have provided Siegel with important data for the estimation of the duration of pregnancy, carefully collected over a period of three war-time years. His material consisted of 125 cases in which the exact dates of conception and labour could be positively ascertained, resulting in the birth of 62 boys and 63 girls. The average period of gestation reckoned from conception was found to be 272.6 days for boys and 267.5 days for girls, whereas the corresponding figures, reckoning from the date of the last menstruation were found to be 282.8 and 282.0 respectively. From a consideration of his own records together with those found in the literature of the subject he considers that the average duration from conception is 271.3 days for boys and 268.7 days for girls, and from menstruation 281.2 days for boys and 281.3 days for girls. From the differences in the gestation periods of boys and girls as shown by the differences in the period reckoning from conception and from menstruation respectively, as well as their differences in weight and length at birth, Siegel comes to the conclusion that boys on the average are carried from two to three days longer than girls. The customary gestation period was found to be exceeded in about two per cent. of all pregnancies, the extreme limit of gestation being taken as 320 days from conception and 331 days from menstruation. During the war the period of gestation was increased on the average by two to four days; the average increase being due to lengthening of gestation to 289 or more days from menstruation in four per cent. of the cases.

Supernumary and accessory ovaries and their tumours. Liegner describes a case in which a large cystic tumour filling the abdomen and reaching up to the diaphragm presented all the macroscopic and microscopic characters of a multilocular ovarian cyst of the cystoma simplex type. Its pedicle, which was twisted through 180°, and was the thickness of the finger, was

attached to the back wall of the uterus to the left of the middle line near the insertion of the Fallopian tube. Both ovaries and tubes were present in their normal position and were of normal appearance and were quite unconnected with the tumour. The uterus was normal in size and position and there were no signs of inflammation in the pelvis. Liegner therefore considered it to be a cystoma of a third supernumary ovary.

By supernumary ovary is meant a third ovary possessed of its own proper ovarian ligament and Fallopian tube as in v. Winckel's case. By accessory ovary is meant one which, whilst anatomically and physiologically distinct, does not possess its own proper ovarian ligament and Fallopian tube. Tumour formation, both malignant and benign, may occur in such ovaries precisely as in normal ovaries and present the same complications. The following have been collected from the literature by Stolz :—cystomata 10 times, embryomata 14, adenosarcoma 1, and myosarcoma 1.

Other clinical phenomena such as the occurrence of pregnancy or continuation of menstruation after bilateral ovariotomy may also be ascribed to the presence of supernumary or accessory ovaries.

The relationship between asphyxial and difficult labours and subsequent psychic and nervous disturbances. Investigating the mental condition of 339 children delivered in the University Clinic at Breslau ten years later when the children had arrived at the school-going age and correlating them with the obstetric histories, which were divided into three groups, namely (1) asphyxial births, (2) labours in which assistance was rendered (forceps, version, extraction), and (3) normal and spontaneous deliveries, Hannes can draw no other conclusion than that difficult and asphyxial births predispose to idiocy and to abnormal psychic development in no higher degree than do normal spontaneous deliveries.

On gonorrhœal cystitis. Gonorrhœal cystitis may be divided into cystitis colli gonorrhoica and cystitis corporis gonorrhoica. The former is a common condition and is readily diagnosed, whilst the latter is very rare and difficult to diagnose. This can only be done when gonococci are cultivated from urine obtained aseptically by puncture of the bladder. Cystoscopy is of some value but does not give typically characteristic appearances

On pyelocystitis in the new-born. Although occurring frequently in older sucklings and young children pyelocystitis has been seldom recorded in the new-born. Hornung records such a case from the University Clinic at Kiel where the symptoms developed on the third day. Streptococci were abundantly present in the urine obtained by catheter. Under treatment with urotropin these gradually disappeared, to be replaced on the eighteenth day by bacillus coli, which persisted in the urine. The child died of diphtheria some weeks later. F. E. TAYLOR.

Monatschrift für Geburtshülfe und Gynäkologie.

Vol. 54, Nos. 2 and 3, *August*, 1921.

On the anatomy and physiology of the placenta. F. D'ERCHIA.

*Further experiences of eclampsia. E. ESSEN-MOLLER.

*New material on the treatment of septic abortion. W. OFFERMAN.

Atypical difficult labour—missed labour—intra-partum rupture of the symphysis. E. SCHROEDER.

New experiences with Kielland's forceps. K. RIEDIGER.
*Experimental researches on ectopic decidua. Prof. F. UNTERBERGER.
The therapy of combined rectal and genital prolapse. Prof. J. HALBAN.
Congenital hypertrophy of the portio vaginalis in a new-born child. H. HERFARTH.
On two cases of puerperal erysipelas of the breast. J. RATING.

Further experiences of eclampsia. The term eclampsism was introduced by Bar in Paris for the condition in which premonitory symptoms of eclampsia such as albuminuria, œdema, cerebral symptoms, headache, vomiting, heightened blood pressure occur, and this term is endorsed by Essen-Möller. He strongly recommends the interruption of pregnancy early in this condition of eclampsism before the onset of eclamptic convulsions. In Sweden this method of treating eclampsia is known as "active prophylaxis."

The treatment of septic abortion. Offermann has analysed the results obtained in the treatment of 64 cases of uncomplicated febrile abortion by various methods, obtaining better results from the expectant than from the active methods of treatment, the fever yielding more quickly to the former than to the latter methods. This is especially the case in streptococcal and in criminal abortions. His expectant treatment consists in the administration of ecbolics such as quinine and pituglandol, which usually suffices to clear up the condition. If not, clearing out the uterus should be delayed until the fever has been in abeyance five days and until streptococci have disappeared from the vaginal secretion.

Experimental researches on ectopic decidua. The term ectopic decidua was employed by Robert Meyer to designate connective tissue cells outside the cavum uteri which showed decidual changes. Unterberger investigated this subject experimentally. Using strict aseptic precautions he produced ruptures in the subserous cellular tissues of the uteri of both pregnant and non-pregnant rabbits. Nine days later the uteri were extirpated and examined. Decidual changes were found in the pregnant, but not in the non-pregnant uteri. They were also found in the absence of inflammatory changes.

From the experimental findings as well as from his clinical experience, Unterberger concludes that ectopic decidua formation must be considered to be a physiological process. Under the influence of pregnancy subperitoneal lacerations produced by the rapid growth of the uterus induce decidual changes in the connective tissue cells. The rupture of adhesions when present also exerts a favourable influence on the production of decidual changes. There would appear to be no connexion between ectopic decidua formation and inflammation, since the former can be brought about in lacerations experimentally produced in animals in the entire absence of inflammatory changes. F. E. TAYLOR.

Zeitschrift für Geburtshülfe und Gynäkologie.

1921, Vol. lxxxiii, No. 2.

*The clinical and pathological anatomy of amenorrhœa. J. NOVAK and E. GRAFF.
Proliferative changes in hydatidiform moles. HANS HINSELMANN.
*On the prevention of puerperal fever. WALTER SCHMITT.

On the significance of hæmorrhage in placenta prævia. BENNO LIEGNER.
*On methods of delivery in contracted pelvis. WALTER SCHMITT.
On intrauterine rigor mortis. BENNO LIEGNER.
*A case of cervical placenta prævia. HEINRICH KRAUSE.
On treatment with radium and X-rays. W. BENTHIN.
*The weight-curve of breast-fed children in the first fourteen days of life. K. KOCH.
Retrogressive gland changes of the endometrium in war amenorrhœa.

The clinical and pathological anatomy of amenorrhœa. The authors investigated the histological condition of the endometrium during periods of amenorrhœa of varied duration, and divide the curettings into three types: (1) in which the normal cyclic changes occur; (2) in which the endometrium is in the resting stage; and (3) an endometrium showing atrophy. They argue that the type of endometrium depends on the degree of ovarian activity, and that the prognosis is therefore worst in the third type. The performance of curettage in itself tended to a return of menstruation.

On the prevention of puerperal fever. An analysis of the 10,000 deliveries in the Würzburg clinic between 1907 and 1919 shows a total mortality from puerperal fever of 0.12 per cent. The writer considers this a negligible mortality in what is probably the worst equipped of the German lying-in hospitals. The cases were examined several times by students and midwives. Schmitt thinks that if, in such circumstances, the mortality is so low the replacement of vaginal examination by rectal is quite unnecessary and not without danger.

On methods of delivery in contracted pelvis. This article is an interesting summary of some five hundred cases of contracted pelvis treated by various methods. The cases are classified entirely according to the contraction of the conjugata vera, and no distinction is drawn between flat and generally contracted pelves. Version as a method of treatment in moderate degrees of contraction gave a fœtal mortality of 47 per cent. Induction after the 36th week gave good results, the technique being the insertion of a de Ribes' bag, and when this was expelled, internal version and extraction of the child. Cæsarean section, with the lower uterine segment incision, was a favourite method, and gave a maternal mortality of 2 per cent. Pubiotomy had been given up for the last two years as the maternal complications were frequent.

A case of cervical placenta prævia. The article is illustrated by drawings, and sections are described to show that the implantation of the placenta was on the cervical canal. In the case described the author suggests that the low implantation was due to endometritis.

The weight curve of breast-fed children in the first fourteen days of life The investigation of the weight variations of 300 breast-fed babies gave the following interesting results:—

The quantity of milk taken at each feed varies considerably with different children, and often the children taking less than the average for their weight do better than those taking a feed above the average.

The biggest children more often give a really unsatisfactory curve than the small children (above 5½ lbs.). Only 25 per cent. of the babies regain their birth weight by the fourteenth day. DOROTHEA TAYLOR.

Zeitschrift für Geburtschulfe und Gynäkologie.

1921, 84, Ht. 1.

On parametric and subperitoneal hæmatoma following labour. BECKMANN.

*Causes and meaning of œdema in the pregnant woman. FINK.

*On fœtal heart sounds. BARTAM.

New operative principles in anus præternaturalis vestibularis. RÜBSAMEN.

*Experimental studies on the embedding and development of the ovum in utero. BIEDL, PETERS, and HOFSTATTER.

On "syren" maldevelopment of the fœtus. LANGER.

*On the proportion of the sexes and the war. GANSSLE.

*On the presence of diphtheria and diphtheroid bacilli in the new-born. KRITZLER.

Raynaud's disease and pregnancy. SILBERSTEIN.

On œdema and pregnancy. Fink examined some 200 cases of women immediately after delivery and found that 95 per cent. presented signs of œdema.

In discussing the causes of œdema in pregnancy he mentions the action of the hypertrophied thyroid in increasing excretion. He thinks the thyroid compensates for the increased metabolism of the mother, and so tends to prevent œdema.

On fœtal heart sounds. Bartam points out that the slowing of the fœtal heart during labour may be due to two causes: (1) deficient oxygenation of the blood from interference with the placental circulation, and (2) compression of the child's brain where there is disproportion between the head and the pelvis. The prognosis in the second case is serious for the child since instrumental delivery must increase the pressure.

On the embedding of the ovum in utero. Biedl, Peters, and Hofstatter, experimenting with rabbits, attempted under various conditions to transplant a recently fertilized ovum from the uterus of one animal into the uterus of another.

In the cases where the foster-mother was not pregnant the results were negative; where she was already pregnant the results were doubtful. They then used a rabbit which two days previously had been delivered of young. The new ova were placed in the uterus, and a well-formed corpus luteum from the previous pregnancy was identified in the ovary.

Three weeks later the animal was killed. The uterus had increased in size and contained three swellings resembling imperfect pregnancies externally, which on section resembled fresh placental sites. There was no sign of a fœtus and the corpus luteum had almost disappeared. It is suggested that the implanted ova had commenced development but that abortion had occurred before the third week.

On the proportion of the sexes after war. Ganssle criticizes the statistics of some German writers who have attempted to prove that there is an increase in the proportion of boys born during and after a war, on the ground that they are based on too small numbers. He quotes figures from his clinic which show a slight increase of boys during the war, while the more extensive statistics from the whole of Würtemburg show no alteration in the usual proportion.

On the presence of diphtheria and diphtheroid bacilli in the new-born. Kritzler took swabs from the throat, nose, conjunctiva, and umbilicus of new-born children and from a quarter of the cases diphtheria bacilli were grown; 6 per cent. gave diphtheroid bacilli. Most of the children were healthy and showed no sign of disease. The writer thinks that diphtheria in the new-born has been exaggerated, and suggests that the diagnosis be made on the clinical signs. L. DOROTHEA TAYLOR.

Muenchener Medizinische Wochenschrift.

July 22nd, 1921.

*The treatment of eclampsia by intravenous sugar solution. HAGEL.

*On examination of the placenta by injecting milk into the umbilical vein. PAUL EDERER.

The treatment of eclampsia by intravenous sugar solution. In his treatment Hagel aims at elimination of toxin and prevention of coagulation in the blood. For the second of these he injects intravenously 1000 gms. of a 10 per cent. solution of glucose. The treatment was suggested by the good results claimed for similar injections in the German Army in cases of severe hæmorrhage. The sugar was not to any marked degree absorbed by the tissues, being mainly excreted by the kidneys.

It is of interest that during the war, with its consequent shortage of food, eclampsia was almost unknown in the district.

On examination of the placenta by injecting milk into the umbilical vein. In view of the seriousness of retention of portions of placenta *in utero*, and the impossibility of ascertaining with certainty the integrity of the organ, the injection of milk by the umbilical vein is recommended; 250 placentas were thus examined. In almost all a slight ooze was seen and discounted. The method was found to fail entirely when the placenta had been expressed. The positive result was thought to be unreliable, but the negative, though not infallible, as early thrombosis had to be taken into account, was sufficiently accurate to justify the recommendation of the test in doubtful cases as an adjunct to naked-eye examination. W. R. ADDIS.

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Positive Wassermann reaction; active syphilis. THAYSEN, T. E. HESS. Positiv Wassermann-Aktiv Syfilis. *Ugesk. f. Læger.*, 1921, lxxxiii, 759; 785. Abstract from "Medical Science: Abstracts and Reviews," 1921, v, 5.

Hess Thaysen criticizes as an easy but unwarrantable assumption that a positive Wassermann reaction is indicative of active syphilis. A comparison of the Wassermann reaction and clinical records of 283 cases of syphilis showed that the severity of the manifestations bore no constant relation to the strength of the Wassermann reaction. Discussing the criteria, apart from the Wassermann reaction, by which to decide whether syphilis is active, latent, or cured, Thaysen admits that, as in the case of tuberculosis, it is very difficult to find direct and convincing evidence.

He adduces the following, more or less circumstantial, evidence in support of his hypothesis that the Wassermann reaction is positive in many cases in the " latent stage " (with infection dating back at least four years), and is yet not indicative of an inevitable recurrence of clinical symptoms. Three series of wholesale Wassermann tests of hospital patients in Denmark showed that, among 2,598 such patients, there were 57, or between 2 and 3 per cent., who gave a positive reaction without any history of infection or clinical sign of syphilis. These investigations showed that, if patients with a positive Wassermann reaction and no other evidence of syphilis be assumed to be syphilitic, they represent one-fourth to one-fifth of all the cases of syphilis in a mixed hospital clientele.

Among 120 cases of syphilis Thaysen found only 46 with clinical signs of syphilis; among the remaining 74 there were 59 with a positive Wassermann reaction. In other words, in the stage of " late latency," the Wassermann reaction is positive in about 50 per cent. With regard to the 57 cases referred to as showing a positive Wassermann reaction and no other sign of syphilis, Thaysen calculates that, if the average age at the time of infection be assumed to be 25 years, then in 12 of these cases the disease must have been latent for 40 years or more, and in 21 for 20 years or more. According to Naunyn, 50 per cent. of the cases of cerebrospinal syphilis develop within the first 5 years after infection, and only about 2 per cent. as late as 20 years after infection. Syphilitic diseases of the aorta give rise to symptoms about 20 to 22 years after infection (Romberg and Denecke). In view of such evidence, Thaysen argues that in most of the above 57 cases it is probable that the syphilis will continue to remain latent, notably in the 28 whose infection had probably occurred more than 25 years earlier. He also argues from his statistics that the nuember of patients with a positive reaction and latent disease is considerably greater than was once thought, and that the combination of a positive Wassermann reaction with " late latency " is to be found in somewhat less than half of all the cases of syphilis surviving infection by 10 to 20 years. The conclusion is drawn that, if a patient survives 25 years after infection, and if during most of this period there has been no clinical evidence of active syphilis, the disease will, in most instances, remain clinically inactive even if the Wassermann reaction is positive. C. L.

Negative Wassermann reaction; active syphilis. CHRISTIANSEN, J. Negativ W.R.-aktiv Syfilis. *Hosp.-Tid.*, 1921, lxiv, 315—19. Abstract from "Medical Science : Abstracts and Reviews," 1922, v, 5.

This paper is a study of the cases of syphilis treated at the Rudolph Berghs Hospital in 1918-20, in which Wassermann's reaction was negative in spite of clinical evidence of an outbreak of secondary or tertiary syphilis. In this 3-year period 1,663 cases of syphilis were examined, and of 12 patients who had never received specific treatment, and who yet gave a positive reaction in the second or third stage of the disease, as many as 7 were either pregnant or were still in the puerperium. No explanation to account for this curious finding is offered. C. L.

Modification of Fontana's method for the demonstration of spirochæta pallida. STURA, G. Una modificazione al metodo Fontana per la colorazione della spirocheta. *Pathologica*, 1921, xiii, 98. Abstract from " Medical Science : Abstracts and Reviews," 1922, v, 5.

This modification concerns the staining stage of Fontana's method and should be carried out as follows: (1) Smears fixed by heat are kept for a few minutes in a solution consisting of formalin 50 ccm., acetic acid 2 ccm., distilled water 150 ccm. (2) After washing with distilled water, pour on the slide a few drops of a mixture of 5 gr. of tannic acid, 3 gr. of carbolic acid, and 100 ccm. of distilled water. Warm on a flame up to boiling point. (3) Wash repeatedly. Pour on the slide pure ammonia; after a few seconds pour it off, and, without washing, allow a 0.5 per cent. solution of $AgNO_3$ to pass from one side of the slide over the smear. As soon as this has become brown the staining is finished and there only remains washing the preparation and drying it over a flame. C. d. F.

A study of the anticoagulating substances in the mucous membrane of the uterus. KING, J. L. *Amer. Journ. Physiol.*, 1921, lvii, 444. Abstract from "Medical Science: Abstracts and Reviews," 1922, v, 5.

This paper deals with the problem of non-coagulability of the menstrual blood. Of the various explanations which have been given one is that the uterine mucosa contains an anticoagulant. This view was tested in the present paper by experiments with press-juice and saline extracts of the uterine mucous membrane from the pig. The results do not support the idea mentioned above. From an examination of menstrual blood the author arrives at the conclusion that the non-coagulability of menstrual blood is a myth, and that the menstrual discharge consists of serum with small bits of disintegrated clot. The so-called "menstrual blood" contains neither fibrinogen, thrombin, nor antithrombin. It is suggested that the blood clots as it leaves the vessels of the mucosa, but locally and in small amounts, so that no large mass of fibrin is formed, and only small fragments of clot, more or less disintegrated, pass from the uterus. W. C.

On the local and generalized action of radium and X-rays upon tumour growth RUSS, S., CHAMBERS, H., and SCOTT, G. M. *Proc. Roy. Soc.*, 1921, B. xcii, 125. Abstract from "Medical Science: Abstracts and Reviews," 1922, v, 5.

The subject of the successful treatment by radiation of a tumour in the animal body is one which resolves itself, broadly speaking, into the action of the radiations on (1) the tumour-cells, and on (2) the animal itself. A *résumé* of the effects observed by the authors and others leads to three main issues on which the considerable experimental work of the paper is based, viz.:—

The effects of the rays in various doses upon

(*a*) Malignant cells before inoculation.
(*b*) Normal animals—(1) Body growth. (2) Subsequent inoculation of malignant cells.
(*c*) Normal animals which are bearing tumours.

The investigation was carried out upon rats with three distinct types of tumour, viz.: Jensen's rat sarcoma, with which the majority of the experiments were made, a very slowly growing rat sarcoma, and a rat carcinoma.

(*a*) Following the method of Wedd and Russ, several slices of excised tumour, having been exposed aseptically to β-rays from 20 mgm. of $RaBr_2 2H_2O$ for various times, were implanted into normal rats. The subsequent tumour growth was accurately recorded and compared with

controls. It was found that the lethal dose, viz. 35 minutes, for Jensen's rat sarcoma and the rat carcinoma employed, was rather lower than that required for the slowly growing rat sarcoma. Further, as the dose decreases from the lethal a reduced rate of growth changes into a rate slightly quicker than that of the untreated tumour, being 1.35 times the normal when the initial tumour material received 12 seconds exposure.

(*b*) The effect of various doses upon the body-weight of normal rats was determined by placing the animals 20 cm. below the anticathode of a Coolidge tube, the radiation being standardized, as far as possible, by means of a gold-leaf electroscope. Batches of animals received daily doses of X-rays, lasting from 2 seconds to 1 minute and maintained from 4 to 9 weeks. The 1 minute exposures were deterrent to increase of body-weight, but under an exposure of 12 seconds the weight increases 15 per cent. more rapidly than that of untreated animals of the same initial weight.

Experiments were made to determine whether the immunity to tumour growth, imparted to rats exposed to small daily doses of X-rays prior to inoculation, could be rendered complete by varying the period over which the daily 12-second dose was continued. Absolute immunity has not been found possible. However, with 77 rats so treated there was, on the average, a reduction in tumour growth of 40 per cent. as compared with that in 77 unexposed animals.

(*c*) The authors have drawn distinctions between three varieties of exposure, viz.. (1) Exposures in which the animal does not share to an appreciable extent in the radiation which the tumour receives—localized exposure to β-rays; (2) *vice versa*—tumour screened from the rays; and (3) a generalized exposure of the whole body to X-rays.

(1) A series of experiments similar to that of section (*a*), except that the tumour was treated while growing in the animal, gave results strikingly similar. The minimum time required to prevent tumour growth was appreciably the same, and again the effect of small radiation doses was to increase rather than to diminish growth. With batches of animals receiving weekly doses of from 10 minutes to 12 seconds it was shown that, " while a weekly exposure of 10 or 5 minutes checks tumour growth, a reduction to 1 minute has an opposite tendency."

(2) Animals inoculated with the sarcoma in the middle of the back were submitted to daily 12-second doses of X-rays, the graft being screened by 2 mm. lead. The treatment lasted one month, and results from 24 animals showed a decreased susceptibility to tumour growth in the 12 rats receiving generalized radiation.

It was apparent that the effects observed in (1) and (2) acted in opposite directions. In order to determine which outweighed the other, when tumour-bearing animals received generalized irradiation at frequent intervals, two batches of rats were compared, the one receiving daily radiation doses of from 5 minutes to 2 seconds, the other none. Daily exposures of over 1 minute result in reduced rate of tumour growth, but the body-weight suffers. With smaller exposures there is less effect in slowing up the tumour, but the body-weight is accelerated over the normal. There appears to be less restraint on the tumour when it is allowed to share in the dosage given to the body.

The bearing of the results upon the radiological treatment of malignant disease in man appears to be twofold. Firstly, as the uniform irradiation of a large tumour is hardly possible, the authors point out that, should the

quantity of radiation reaching the confines of the growth be only a few per cent. of the lethal, there might be a stimulative rather than an inhibitive action upon the malignant cells at these parts. Secondly, although ample evidence shows that large generalized doses of radiation lower the normal resistance to tumour growth the converse holds for very small doses given frequently. The authors conclude that it is therefore a rational measure to supplement local intensive irradiation of a tumour by a feeble generalized irradiation of the patient, care being taken wherever possible not to expose the tumour-cells to this radiation. L. H. C.

REVIEW OF CURRENT LITERATURE. Abstractors are still required for two German and two Italian journals, viz.: *Archiv für Gynäkologie, Zentralblatt für Gynäkologie, Annali di Ostetricia e Ginecologia, Rivista d'Ostetricia e Ginecologia Pratica.* The Assistant Editor would like to hear from readers who are willing to undertake the work.

BOOK REVIEWS.

"A Text-Book of Gynæcology." By JAMES YOUNG, D.S.O., M.D., F.R.C.S., Assistant Physician, Royal Maternity Hospital, Edinburgh; Lecturer on Clinical Gynæcology and Obstetrics, Edinburgh University, &c. A. and C. Black, Ltd. pp. 334, with 183 illustrations.

In no part of his curriculum has the medical student a wider choice of text-books than in the gynæcological branch of surgery. When, in addition to those by British and Irish writers, there are added the text-books of American authors, which are extensively published and distributed in this country, the student of gynæcology may well suffer from an *embarras de richesse*.

If any individual liberty of thought or doctrine were indulged in by the writers, or could their books reflect only the mature experience of the practitioner of gynæcology without the inclusion of the time-honoured teaching of a former generation, each book would bear an individual message, and there might possibly be a justification based on the interest derived from their very individuality.

But, alas, the stern demands of orthodoxy, in the shape of examining bodies, render it impossible for a text-book for students to be other than orthodox, and the student, shy of acquiring any knowledge which may not be of use to him in an examination, will not consider that he is justified in taking any risks in this direction so long as the present examination system endures.

Further, it may be urged from another point of view that the free-lance, writing and teaching from his own experience of things as he sees them, may be a dangerous mentor, in that he might break away from the fetters of orthodoxy and dip too deeply into the refreshing waters of realism.

But realism is dangerous for the student under the shadow of an impending examination. He must learn things as they were and as they ought to be, he must learn the disease and not the patient, if he aspires to turning the scale at his forthcoming judgment. He will learn in after years that mere lists and "varieties," as based on anatomical and pathological classifications, are poor foundations on which to build a knowledge of clinical types.

In so far as Dr. Young's book follows the lines of orthodoxy it will meet with general approval. The salient facts of gynæcology are clearly set forth, with a faithful adhesion to the accepted standards; for example, obstruction to the outflow of the menses located in (1) the cervix, (2) the vagina, (3) the vulva, is described as being the cause of "obstructive or spasmodic" dysmenorrhœa. The classification of this condition is made on an anatomical basis such as uterine, local obstruction, ovarian and tubal, pelvic peritoneum and connective tissue; and, in addition, a type of pain is described as "nervous dysmenorrhœa." We regard this presentation of the subject as being scarcely in accord with the clinical types of monthly pain as met with in the living patient.

When dealing with chronic endometritis, Dr. Young finds his loyalty to orthodoxy strained. But after a gentle expostulation on the unsatisfactory but time-honoured classification into "interstitial" and "glandular" endometritis he reaffirms his allegiance by adopting the old method "for want of a better." We cannot agree that the two chief types of chronic endometritis are senile and tuberculous as Dr. Young leads us to suppose. In our experience the common clinical forms are the post-supræmic and gonorrhœal varieties, while the tuberculous form is extraordinarily rare.

The section devoted to abnormal uterine hæmorrhage is too brief, and hardly deals fully enough with a portion of ordinary gynæcological practice which will bulk so largely in the student's future practice. The same criticism applies to the description of the treatment of perhaps the commonest gynæcological disorder—leucorrhœa. It is dismissed in seven lines and gives no conception of the frequent difficulties of treatment, or any warnings against the very common practice of curettage.

In general, however, the book is a safe student's guide. It is freely illustrated by diagrams, and is clearly and concisely written.

Review of Recent Clinical Reports of Maternity Hospitals.

By TREVOR DAVIES, M.D. (Lond.), F.R.C.S. (Eng.).

Much of the good work done at the various "Maternity Hospitals" passes unnoticed, owing to the fact that no annual report is published. It should be recognized that by no means the least important duty of a Maternity Hospital is the publication of an annual report. A perusal of the four reports reviewed below emphasizes how valuable a means they are of advancing our knowledge of obstetrics. Much time has evidently been devoted to these reports and one feels that the time has been well spent.

The reports are not only of great value individually but are most useful when comparisons are made of the various methods of treatment adopted in the different hospitals. The tendency of most institutions is to rely on one particular method of treatment in an obstetrical emergency. It is just as well to remember that other methods are available, which may be quite as valuable. If the reports of all the Maternity Hospitals were published annually a mine of information would be available for investigation, and many improvements would follow in the management of obstetric cases. The striking results obtained by collecting and investigating all "Cæsarean section" cases, as published in the last number of this Journal, illustrates the value of such a study; this investigation involved an enormous amount of labour, much of which could have been obviated if annual reports of all maternity hospitals had been available. Further investigations on similar lines will undoubtedly be carried out from time to time in the coming years, and it is to be hoped that a complete list of reports of the various "Maternity Hospitals" will be available and easily accessible.

THE ROTUNDA HOSPITAL.

Clinical Report for the year November 1919 *to October* 1920, by Gibbon Fitzgibbon, M.D., Master; J. S. English, M.D. and A. H. Davidson, M.D., Assistants.

1. *Extern Maternity Department.* 1,951 women were delivered, maternal mortality 7; four of these deaths were due to hæmorrhage after delivery.

One fatal case of "sepsis" occurred; this case was a "B.B.A." Manual removal of the placenta was performed in no fewer than 27 cases; it would be interesting to compare these figures with those of the "Intern Maternity department," but unfortunately the latter are not given. One cannot help but feel that the "time factor" may be responsible for the operation in some of the "extern" cases; as a rule the student doing the "Extern Maternity" appointment does not realize the importance of the proper management of the third stage of labour, and too often wants to get it over as quickly as possible.

2. *Intern Maternity Department.* 2,149 deliveries took place during the year with 7 maternal and 101 fœtal deaths.

(*a*) *Maternal Mortality.* In four instances "severe toxæmia of pregnancy" was responsible, and some very interesting observations are given concerning the mode of death in two of them—both cases of eclampsia. Both deaths were believed to have been due to suffocation, which could have been prevented by careful observation of the patients, "only a shake or compression of the chest being required to clear the larynx."

(*b*) *Eclampsia.* Eleven cases occurred, in addition to the two fatal cases just described. There was no maternal mortality amongst these cases, two only of which were "mild." These excellent results were obtained by the now familiar method of treatment employed in Dublin, *i.e.*, water diet, morphia, lavage of stomach and colon, with the introduction of a large purgative into the stomach. The writers of the report consider the purgative as the curative part of the treatment, and insist on the importance of repeated lavage of the colon.

(*c*) *Rupture of the Uterus.* Both the cases were successfully treated by plugging the rent. In one case the unusual practice was adopted of extracting the child from the abdominal cavity through the rent, in spite of the fact that rupture had occurred seven days previously (of a former Cæsarean section scar in all probability) and that the uterus was contracted.

(*d*) *Placenta prævia.* Excellent results were obtained in 14 cases, the majority of which were treated by bipolar version. There were no maternal and six fœtal deaths. Results such as these, and those obtained in the eclampsia cases, give much food for thought in these days, when the tendency is to perform Cæsarean section in similar cases. Comparison of the results obtained show that the non-operative treatment is much more successful than the operative.

(*e*) *Accidental Hæmorrhage.* Seven cases occurred. There was no maternal death. "Rupture of the membranes" was the treatment adopted in five of the cases. In view of the fact that many cases of "accidental hæmorrhage" are toxæmic in origin it would be of great value if a special column for albuminuria were included in the table.

(*f*) *Contracted Pelvis.* Although Skutsch's pelvimeter was used in 32 out of 34 cases treated, one gathers that chief reliance was placed on Müller's method of estimating the relative size of the fœtal head and the pelvis. The oft-repeated statement that the "fœtal head is the best pelvimeter" still holds.

The cases (13 in number) treated by Cæsarean section call for no comment—all did well. Only one other case of Cæsarean section occurred during the year—a severe case of hypermesis at the 34th week. Both mother and child died.

The chief interest in the portion of the report devoted to contracted

pelvis is that *pubiotomy* was performed on three occasions, in two of the cases for the second time. The results obtained were not encouraging; in one case a vesico-vaginal fistula resulted; in another a considerable hæmatoma delayed recovery, and to complete the tale of woe, one of the babies had to be operated upon for a depressed fracture of the skull. The cases emphasize the accidents that may follow the operation of pubiotomy and the reasons for the unpopularity of this procedure in Great Britain.

Bougies were employed for the induction of labour in all but two cases, in which a soft stomach-tube was employed. The writer of the report adds that he has used the stomach-tube for ten years in private practice, with excellent results.

(*g*) *Morbidity*. This, 6.98 per cent., is somewhat above the average for previous years, due to a very high number of extra-genital causes. There were no deaths from sepsis. The administration of antistreptococcus serum and stock vaccines is emphasized. Autogenous vaccines were hardly required in the majority of cases.

The excellent series of tables given in the report could be augmented by one or more giving details of infantile mortality and still-births.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL.

Clinical Report for 1918 (last available Report).

(*a*) *Ante-Natal Work*. It is to be regretted that there was practically no antenatal observation of cases carried out in the wards of the hospital during the year. Of the 1,947 cases admitted, only three were discharged undelivered. Subsequent reports will show an improvement in this respect, but the fact remains that only a small amount of indoor observation and treatment can be carried out during pregnancy, owing to the urgent demand for beds that always exist for emergency admissions.

(*b*) *Maternal Mortality*. Eight maternal deaths occurred during the year. A full account of these is given in the report.

(*c*) *Albuminuria*. The report reveals the interesting fact that 30.6 per cent. of the cases admitted into hospital were found to have albuminuria during labour. In most of these cases the albumen had disappeared from the urine by the fifth day of the puerperium; 40 of the cases presented toxic symptoms, and 17 of these had eclampsia.

(*d*) *Eclampsia*. Medical treatment was carried out in 12 of the 17 cases and all the mothers recovered. It is of interest to note that veratrone was used in nine of these cases, and there is no doubt that this drug is of definite value in the treatment of eclampsia. Cæsarean section was performed in the remaining five cases, but was only successful in three.

Analysis of all four reports now reviewed shows that the expectant treatment of eclampsia is undoubtedly the best one to employ and is attended by a maternal mortality roughly one-quarter of that which occurs with Cæsarean section. The latest figures on this subject published by Munro Kerr and Holland strongly support this contention.

(*e*) *Placenta Prævia*. Excellent results were obtained in the 27 cases treated, only one mother died. Here again version was the popular method of treatment, but in two cases Cæsarean section was successfully performed.

(*f*) *Accidental Hæmorrhage*. Only ten cases of this complication were met with, one of which was of the " concealed " variety. This case terminated fatally. The method of treatment might well be included in the tables given, also the presence or absence of albuminuria.

(*g*) *Induction of Labour.* This method of treatment for contracted pelvis is extremely popular at this hospital. Contracted pelvis was the indication in 59 of the 77 cases; there was no maternal mortality in this series of cases but two mothers died in the remaining 18 cases induced. One was a case of hydrocephalus, in which the placenta was adherent and postpartum hæmorrhage occurred; the other was a severe case of cardiac disease. In neither case could the induction be blamed for the fatal ending. Fifteen of the children were still-born. Induction by bougies was the method generally employed.

(*h*) *Cæsarean Section.* In 35 of the 44 Cæsarean sections contracted pelvis was the indication. One maternal death occurred in this series. The two maternal deaths in the five cases of eclampsia treated by Cæsarean section have already been referred to. In one case hysterectomy was also performed owing to the presence of fibroids.

(*i*) *Maternal Morbidity.* This is very high, 22 per cent., but the standard employed is very severe; any case which at any time shows a temperature of 100° F. is classed as morbid. The various causes of morbidity are fully given in a good table.

(*j*) *Stillbirths.* The report concludes with excellent tables of stillbirth and infant mortality.

The name of the author of this excellent report is withheld.

ST. MARY'S HOSPITAL, MANCHESTER.

Clinical Report for 1920, by John W. Bride, M.D., Registrar, and C. Philip Brentnall, M.B., Resident Obstetric Officer.

One very satisfactory feature of the report of this hospital is the attention paid to antenatal observation and treatment carried out in the hospital itself. No fewer than 112 cases were admitted during pregnancy. Most maternity hospitals have large antenatal clinics attached to them, but indoor observation and treatment are very deficient in the majority, primarily, no doubt, owing to the lack of accommodation and funds.

(*a*) *Maternal Mortality.* This was 2.6 per cent.; 1,107 women being delivered during the year. This high death rate is partly accounted for by the fact that "many cases are sent in by practitioners after attempts at delivery had failed."

(*b*) *Placenta Prævia.* No fewer than 67 cases were treated, with 5 maternal and 45 fœtal deaths. This high maternal mortality is accounted for by the fact that in 27 of the cases the placenta was "central," while in one of the cases phthisis was responsible for the fatal ending. The treatment adopted in 38 of the cases was version, associated with 2 maternal and 36 fœtal deaths. In three of the cases of central placenta prævia, Cæsarean section was performed with no maternal or fœtal mortality.

It is undoubtedly true that the fœtal mortality given above would have been much reduced if Cæsarean section had been the method of treatment employed, but it is equally true that the maternal mortality, in all probability, would have been higher than it actually was. Munro Kerr and Holland found it to be 11.5 per cent. in a series of 139 cases.

(*c*) *Accidental Hæmorrhage.* Albuminuria is stated to be present in 2 of the 26 cases treated. Routine examination of the urine, in all cases of accidental hæmorrhage, will undoubtedly reveal the presence of albumen in a larger number. No maternal mortality occurred. In no fewer than 14 delivery was left to "natural forces"; in the remaining 12 the membranes

were ruptured. These results confirm what has been recently emphasized by Gordon Ley.

(*d*) *Ruptured Uterus.* One case is recorded, which was successfully treated by packing the rent with gauze.

(*e*) *Contracted Pelvis.* The report shows a very high incidence of cases of contracted pelvis in Manchester; 123 cases were actually treated in hospital by operation. Of these 101 were treated by Cæsarean section with four maternal deaths. Unfortunately, in nearly half the cases, the pelvic measurements are not fully noted, so that it is impossible to criticize fairly what appears to be an extraordinarily high percentage of Cæsarean section cases. The great prevalence of rickets in Manchester has, however, to be taken into consideration in this connexion. Two of the maternal deaths occurred in cases where attempts at delivery had been made before admission, and serves to emphasize the very high mortality that occurs when Cæsarean section is performed for such cases. Pulmonary embolism and acute tubercular broncho-pneumonia were responsible for the mortality in the other two fatal cases.

(*f*) *Albuminuria.* Most of the 49 cases responded to treatment. The report does not give any information of the cases that did not respond, except in one instance; in this case a fatal issue occurred from uræmia, two days after delivery.

(*g*) *Eclampsia.* This complication was met with in 56 instances, in spite of the care taken in antenatal observation and treatment. One can only conclude that full advantage is not taken of the antenatal clinics, and no doubt in many of the cases there were no alarming symptoms until fits occurred. The high maternal mortality, 23 per cent., makes one realize very forcibly what a dreaded complication eclampsia is, and no effort should be spared in educating the public to the fact that the disease is preventable.

Expectant treatment was adopted in 51 of the cases; 8 maternal deaths occurred in this series. Four of the five cases treated by Cæsarean section died, and this only confirms the fact that expectant treatment yields far better results in every respect.

(*h*) *Infant Mortality.* Excellent tables are given showing the causes of death in the 270 cases that occurred during the year.

(*i*) *Morbidity.* "Sepsis" was responsible for 55 of the 74 cases of morbidity occurring in the hospital during the year. Many of these cases had been previously treated at home before admission. There is a good table illustrating the type of case which is followed by pyrexia.

BIRMINGHAM MATERNITY HOSPITAL.

Report for 1920.

Out-Patient Department. District midwives were responsible for the delivery of 1,556 women during the year. Medical help was required on 194 occasions, *i.e.*, once in 13 cases. There were two maternal deaths, the cause of which is not given in the report, and 57 fœtal deaths.

In-Patient Department. 786 women were delivered, with 12 maternal deaths (1.36 per cent. mortality). Full notes are given of the fatal cases.

(*a*) *Eclampsia.* The report contains an excellent summary of the 24 cases met with during the year. There were three maternal deaths (12.5 per cent. mortality). Expectant treatment was adopted in all these cases,

in addition to which labour was induced in seven. One case of threatened eclampsia was successfully treated by Cæsarean section.

(*b*) *Induction of Labour.* Only 15 cases were induced during the year, and it is evident that the incidence of contracted pelvis is very much less in Birmingham than in Manchester. Of the 15 inductions, only 3 were for contracted pelvis. In all but one case bougies were employed with satisfactory results; de Ribes' bag was used on one occasion.

(*c*) *Craniotomy.* No fewer than 19 cases occurred during the year, with no maternal mortality. These excellent results are a striking commentary, if one is needed, of the safety of this operation, compared with Cæsarean section in septic cases.

(*d*) *Cæsarean Section.* This operation was performed on 48 occasions, with five maternal deaths. Here again the high maternal mortality is due to the fact that in three of the fatal cases several attempts had been made to deliver with forceps before admission, while in another craniotomy had been attempted outside. The other maternal death occurred in a case of impacted shoulder presentation, with prolapsed arm. One would have thought that decapitation would have been the correct method of treatment in this case, as version was impossible. Even granting that laparotomy was advisable, it would have been better to have removed the uterus.

(*e*) *Placenta Prævia.* Forty-four cases were met with, in 30 of which version was performed. One patient died soon after admission undelivered, with a central placenta prævia. There was only one other maternal death. Cæsarean section was successful in the only case in which this method of treatment was adopted.

(*f*) *Accidental Hæmorrhage.* It is satisfactory to note that there was no maternal death in the 17 cases of this complication. Perusal of the various reports shows how much less dangerous this complication is compared with placenta prævia. The tables given could well be amplified and the presence or absence of albuminuria should be noted.

(*g*) *Maternal Morbidity.* An excellent table is given of the 99 cases of morbidity that occurred. The percentage rate, including fatal cases, is 12.6, but it is only fair to state that 31 of these cases were known to have been examined outside.

(*h*) The report concludes with an account of the 110 stillbirths during the year. Tables of the known and contributory causes follow.

One lecture on "Ophthalmia Neonatorum" is given to each batch of "Pupil Midwives" by the Hon. Ophthalmic Surgeon. This excellent practice might well be adopted in every maternity hospital.

The name of the author of this Report is withheld.

REPORTS OF SOCIETIES

THE ROYAL SOCIETY OF MEDICINE.

Section of Obstetrics and Gynæcology.

Meeting held November 3rd, 1921.

Professor Henry Briggs, F.R.C.S., President, in the Chair.

Mr. A. E. Mortimer Woolf exhibited a specimen of a uterus showing double-ruptured interstitial ectopic pregnancy. The patient had been married seven years and had one child six years old; there had been no other pregnancy. Her last period ended February 13th, 1920. On April 14th, while dressing at 8.30 a.m., she was seized with sudden sharp pain in the left side of the abdomen which caused her to double up. This pain lasted until the evening, and she was free from pain until 10.30 a.m. on April 18th, when she was again seized with acute abdominal pain which was general. She fainted, and there was continuous pain and frequent vomiting until admitted to hospital the next afternoon.

On examination the abdomen was distended in its lower part; there was rigidity and tenderness and the flanks were dull. The pulse was thready and its rate 144. Nothing could be detected by vaginal examination. When the abdomen was opened a large amount of dark blood escaped. In the intramural portion of both tubes there were gestation sacs which had ruptured.

In view of the precarious condition of the patient it was thought to be safer to do a subtotal hysterectomy. The patient made an uneventful recovery.

The specimen was discussed by Dr. Herbert Spencer, Dr. Giles, Mr. Neatby, and Mr. Gilliatt.

Dr. Spencer said as far as he knew it was unique. In cases of interstitial pregnancy the tube had been stitched into the uterus. He thought it would have been better to have done that in this case and thus preserved menstruation and the possibility of pregnancy.

Dr. Arthur Giles also thought the specimen unique; bilateral tubal pregnancy of any kind was rare.

Mr. Gilliatt thought unless microscopical evidence of pregnancy were found on both sides the specimen could not be considered a bilateral tubal pregnancy.

Dr. W. J. O'Donovan showed a gold button contraceptor. This had been introduced in New York some months previously and had given rise to irritation of the vulva. The instrument consisted of two diverging arms attached to the button, the arms lay in the uterine cavity and held the button close to the external os.

Dr. Giles said that he had occasion to enquire about these instruments some time ago and found they were advertised as the latest cure for sterility.

Mr. Norman Haire said they were in common use in America and Germany. He was informed that they did not prevent conception, but if

it did occur abortion followed, which was often septic. He showed a rather different type of intracervical pessary. He considered them all most dangerous.

Dr. G. CRANSTOUN gave a short communication on a cystic adenoma of the uterus. The cyst formed filled the whole abdomen and contained fluid very similar to retained menstrual blood. The patient was a single woman of forty-five with two years' history of gradual enlargement of the abdomen. Menstruation had been regular and normal until August, 1920, eight months before admission. The wall of the cyst tore readily and was very difficult to separate from the parts to which it was adherent. The uterus was found to be enlarged by what appeared to be several fibromyomata. Panhysterectomy was decided upon, and after the uterus was separated from its attachments the cyst was separated from adherent gut. The formation of the huge cyst seemed to be due to central degeneration of the adenomyoma, which had distended the upper part.

Dr. SPENCER had seen one very similar case.

Dr. FAIRBAIRN, who removed the tumour, thought at the operation that he was dealing with a cystic degenerative myoma.

Mr. GORDON LEY thought that the presence of blood in the fluid was due to the endometrial processes in the adenoma going through the same changes as occurred in the endometrium in menstruation.

Dr. MACKENZIE WALLIS read a paper on

GLYCOSURIA IN PREGNANCY,

which is published in full on page of the present number of the Journal.

In the discussion that followed Sir William Willcox congratulated Dr. Mackenzie Wallis. He thought that in addition to excessive activity of the pituitary gland, attention should be directed to the increased activity of the thyroid. He considered the carbohydrate tolerance in patients with diabetes mellitus the determining factor as to whether pregnancy should be allowed to continue or not. If below 20 grammes pregnancy should be terminated, but above 50 grammes with special care it might be allowed to continue. Marked excretion of acetone and diacetic acid in these cases was serious.

Dr. GEORGE GRAHAM said he agreed with nearly all Dr. Wallis had said, but differed from him in his interpretation of the blood sugar curves. He regarded the glycosuria of pregnancy in the same light, and thought that the strain of pregnancy caused a temporary diminution of the sugar tolerance.

Dr. CAMMIDGE pointed out that Dr. Mackenzie Wallis appeared to think glucose and lactose were the only sugars met with in the urine in pregnancy. Analysis in cases he had seen during the last fifteen years showed that glucose was present in abnormal amount in only 52 per cent., while lactose alone was found in 22 per cent. In the remaining 26 per cent. the reducing substances were either lævulose or pseudo-lævulose. In his experience the determination of the nature of the reducing substances present in urine was of considerable practical importance from the point of view of treatment. Cases of pseudo-lævulosuria and lævulosuria did badly on ordinary diabetic treatment, but well on an abundance of carbohydrate. Cases of dextrosuria required careful regulation of the total diet according to the tolerance of the individual patient. The most difficult cases to treat satisfactorily were those passing a mixture of glucose and pseudo-lævulose.

Meeting held on December 1st, 1921.

Professor Henry Briggs, F.R.C.S., President, in the Chair.

An unusual case of ectopic gestation.

Mr. John Ellison showed specimens from an "unusual case of ectopic gestation." The patient was a young woman who had been married four weeks and whose last period was a fortnight before marriage. For a week before admission to St. George's Hospital there had been some tenderness of the breasts, and five days before she had sudden pain in the right iliac fossa which made her feel faint. There was no further pain until the morning of admission when it recurred and caused fainting.

On admission she was pale and restless, temperature 100°, pulse 68, soft and compressible; the breasts showed early signs of pregnancy. There was a visible mass in the right iliac fossa which was tender and dull, and the tissues of the inguinal canal appeared to be infiltrated as though some of the contents of the right iliac fossa were trying to escape by that route. There were no signs of free fluid in the peritoneal cavity. Per vaginam the uterus was found high and pushed to the left by a large cystic swelling in the right and anterior fornices. There was a slight blood-stained vaginal discharge.

The abdomen was opened. The tissues of the abdominal wall were infiltrated with blood, but there was no free blood in the peritoneal cavity. The uterus was somewhat enlarged and over to the left. Both appendages were normal. The peritoneum covering the right side of the pelvis and the right iliac fossa was raised in a large mound extending from the pelvis to the right kidney, the right tube, unaltered, lying on top of this, connected to it by some 2½ inches of unobliterated mesosalpinx. On holding up the tube a blood-stained cone could be seen with its apex at the middle of its isthmial portion and its base, some 1½ inches in length, reaching the above-mentioned mound.

The right tube was removed and the posterior layer of peritoneum incised, and a large quantity of blood-clot removed from the retroperitoneal space, exposing large vessels. A hole in one of the veins was closed with catgut. A tube and gauze pack were put into the retroperitoneal space and three days later the plug was removed under gas. On the ninth day the wound had to be reopened, as the retroperitoneal cavity had again filled up with blood. After this recovery was uninterrupted.

The section of the tube at the point where the cone touched it showed normal lumen and wall with blood surrounding it. Sections of the rest of the tube were normal. The blood clot from the retroperitoneal space contained definite chorionic villi; an ovum was therefore developing in the retroperitoneal space and had eroded one of the pelvic veins. The tube appeared to be quite normal, and for that reason the author suggested that the primary implantation had occurred on the pelvic peritoneum and embedded itself in the retroperitoneal space.

The specimen was discussed by Dr. Giles, Dr. Lapthorn Smith, and Mr. Gordon Luker.

Dr. Giles asked if serial sections had been made of the tube in the region of the apex of the cone of blood? He was not prepared to say that an ovum could not make its way through the tissues of the broad ligament as suggested, but he thought the most likely explanation was that the ovum had eroded the tube.

Dr. LAPTHORN SMITH thought the author's explanation was probably the correct one.

Mr. GORDON LUKER asked if the blood pressure had been taken before operation? He suggested that the slow pulse rate was that seen in certain cases of severe hæmorrhage and shock associated with low blood pressure. In such cases, before treatment for shock for a few hours, immediate operation might prove fatal.

SQUAMOUS CELLED CARCINOMA OF THE CERVIX UTERI.

Mr. JOHN ELLISON showed a specimen of "squamous celled carcinoma of the cervix uteri associated with a nodule of spheroidal-celled carcinoma of the body."

The patient was a woman of 58, nullipara, who had reached the menopause at 36. In 1916 she first noticed that "her right breast was drawn in"; in 1920 she was seen by Mr. Back, who admitted her to hospital and removed the breast for an obvious carcinoma. While in hospital Mr. Ellison saw her on account of blood-stained vaginal discharge which she had had for two years or more, but had not mentioned it to anyone. He found a carcinoma of the cervix which he considered just operable. In June, 1920, he removed the uterus and was unable to find any enlarged glands in the pelvis or evidence of metastases in the liver. The patient recovered well and in July the pelvic condition was quite satisfactory.

In August a course of radium to the pelvis was given, as the general appearance of the patient suggested secondary deposits somewhere though nothing definite could be made out. The patient suffered from headaches which became more frequent and severe, and in September the left internal rectus became paralyzed, causing diplopia, and she died in a comatose condition at the end of the month. There were no signs before death of recurrence in either seat of operation.

The specimen showed a large carcinomatous ulcer of the cervix of the squamous type and two nodules in the body; one of these was a carcinoma of the squamous type and appeared to be continuous with the cervical growth; the other consisted of closely packed cells of the spheroidal type with very little intercellular tissue, and was not continuous with the growth. The author regarded this spheroidal-celled nodule to be a secondary deposit from the carcinoma of the breast.

Dr. AMAND ROUTH, in commenting on the specimen, alluded to one he had brought before the Obstetrical Society in 1896, in which there was a carcinoma of the cervix and one of the fundus with a healthy area between them.

Mr. SIDNEY FORSDIKE showed microscope slides from a case of carcinoma of the cervix in a virgin of 24 years and 10 months of age. When 23 years and 3 months old she began to have irregular losses from the vagina; she saw a doctor who told her to go to hospital if they did not cease. The bleeding became worse and there were occasional floodings, but she did not go to hospital until November, 1921, 1 year and 7 months after the onset of symptoms.

Then on examination the hymen was found intact, but by rectum the cervix was felt hard and enlarged. Under an anæsthetic a few days later a large growth involving the vaginal walls and bases of broad ligaments was found; a piece was removed for pathological examination. The growth

was quite inoperable and radium treatment was given. The microscope showed the growth to be columnar-celled carcinoma.

Mr. R. H. PARAMORE read a paper on

ECLAMPSIA AND ITS INCIDENCE,

of which the following is a full abstract.

Eclampsia is marked by a profound toxæmia. It is admitted that the toxæmia causes the eclampsia; the question is what causes the toxæmia. The author rejects the view that the toxæmia results from placental changes; and, indeed, that a strange toxin arises from other parts (breast, ovary, thyroid, intestine, fœtus). He believes the maternal visceral lesions, which obviously precede the eclampsia, are primary to the toxæmia and explain it. Necrosis of the liver and kidneys must cause some symptoms; and in the author's opinion suffice to explain the toxæmia which exists. This view is supported by the rôle food (especially protein food) plays in the rise of the toxæmia; by the considerable increase of non-protein nitrogen in the blood which Killian and Sherwin have recently demonstrated in these cases; and by the urinary changes, conspicuous amongst which is the large proportion of undetermined nitrogen.

The author believes eclampsia is simply an uræmia, distinguishable from other acute uræmias only in the method of its production The necrosis of the maternal kidney and liver is an ischæmic necrosis—a necrosis due to a shutting off of the blood supply. The cessation of the blood flow is determined by an occlusion, not of the supplying arterioles, but of the capillaries into which these arterioles lead; and the occlusion is produced, not by a thrombosis, but by a pressure. The thrombosis is secondary to the necrosis; and the pressure in the raised intra-abdominal pressure which in certain cases of pregnancy is exaggerated, and to which the rises induced by activity and especially by labour are super-added.

The incidence of eclampsia supports this conception. Thus, eclampsia is most common in primigravidæ—that is, in women in whom the abdominal wall has not suffered by having been previously stretched; and in whom, therefore, the intra-abdominal pressure is likely to be higher than in pregnant multiparæ. Eclampsia is more common in strong muscular women than in fragile or diseased (*e.g.*, phthisical) women—for the reason that the musculature in the former, being better developed than in the latter, causes the intra-abdominal pressure in such to be higher than in the latter at corresponding periods of pregnancy. The unmarried pregnant woman is more prone to eclampsia than the married, because she constricts her abdomen by corsets, endeavouring to prevent the abdominal distension which the woman in wedlock has no motive to hide. These three types of case form a class by themselves.

Eclampsia, however, also occurs in other kinds of cases—in twins, hydramnios, concealed accidental hæmorrhage, and in hydatidiform mole; and these form a second class. In all these the contents of the uterus are so different from each other as to indicate that the cause of eclampsia does not reside within the uterus. In spite of this dissimilarity, the first three types at least have one conspicuous feature in common—that the uterus is greatly larger than it should be for the period of the pregnancy. This, necessarily, must affect the intra-abdominal pressure, causing higher pressures to occur than in the opposite condition, other things being equal. The condition of affairs in the case of hydatidiform mole, when the pre-eclamptic toxæmia arises, in this respect is uncertain; and is left for others

to discuss. But in the other three types of case it is plain eclampsia is associated with a presumptive rise of intra-abdominal pressure.

And labour, by which great rises of this pressure occur, also plays a part in the causation of eclampsia. Post-partum eclampsia is to be attributed to the effects of labour. Labour increases the albuminuria of pregnancy, and often first causes albumen to appear. Labour is thus comparable with the exercise of athletes. Clearly, labour often causes changes in the kidney; similarly, at times, it must occasion similar changes, perhaps even necrosis in the liver! In support of this there is the evidence of *accouchement forcé* in eclampsia to remember. Before this treatment was superseded by Cæsarean section, it was believed by some that it had a pernicious effect. The reason was it caused too much straining. Prolonged labour, *e.g.*, when obstructed, in presumably healthy women, acts similarly. The history of vagino-fixation, should the patient become pregnant, affords such evidence. Macan relates a series of disasters from the German School after the performance of this operation. Eclampsia occurred certainly twice; and I believe three times. The patients were in labour many hours.

The question of the effect of straining on the blood flow through the viscera was not discussed. The author stated that the blood chooses the easiest path, and that not all the organs, or indeed all parts of the same organ, are supplied in quite the same way. The great mass of blood reaching the liver has first to pass through the gastric and intestinal capillary network; whilst that reaching the convoluted tubules of the kidneys must first traverse the glomeruli. If, in consequence of an increase of intra-abdominal pressure, an obstruction in these secondary capillary areas should occur, it could surprise no one that the tissues concerned should suffer from an inanition or that an ischæmic necrosis should result. The question was whether a study of the intra-abdominal pressure and of the incidence of eclampsia warranted the acceptance that such actually happened. The author believed that the evidence more than justified such a conclusion.

In the discussion that followed Mr. MALCOLM said: Mr. Paramore has brought forward a definite, easily understood explanation of an admittedly difficult question and argued his point with ingenuity, but when he argues that the woman's body "with its ancestral memories" should, at this stage of our history, be fully equal to bearing a child without any dangerous chemical disturbances, he overlooks the fact that the same argument is applicable to the power of the body to avoid the effects of a too great pressure upon the liver and kidneys. Again, it is stated in the paper that the blood in its course chooses the easiest path. This ignores altogether the control of the vessels by the sympathetic nervous system, which should bring about a contraction of all the vessels of the body rather than allow a pressure necrosis of the important organs affected in eclampsia. Definite signs of such a general vascular contraction should develop before a necrosis takes place. I agree with those who assert that an ovarian tumour may grow even more quickly than a pregnant uterus, and in cases of acute intestinal obstruction an enormous increase of abdominal pressure may be created in forty-eight hours, but there is no eclampsia.

Dr. GILES asked whether Mr. Paramore had considered the question of the production of lesions of the liver and kidney as the result of increase of intra-abdominal pressure from tumours, apart from pregnancy. He had

removed an ovarian cyst weighing 30 lbs. from a woman in labour, and in the days when ovarian cysts were not operated upon so early these tumours commonly reached 40 or 50 lbs. But one did not hear of these patients being affected by toxæmia conditions analogous to those associated with eclampsia.

The paper was also discussed by several other Fellows, who had difficulty in accepting the pressure theory, as no such effects were found in cases of rapidly growing abdominal tumours, though they might reach the size of the uterus at term.

Meeting held on January 5th, 1922.

Professor HENRY BRIGGS, F.R.C.S., President, in the Chair.

Mr. BECKWITH WHITEHOUSE showed a specimen of tubal lithopædion. The patient was a woman of 45, who had had two children. Fifteen years before being seen by Mr. Whitehouse, she had had what was described as a very bad miscarriage followed by an acute illness, which had kept her in bed practically for three months. There had been no subsequent pregnancy, and the periods became regular, although profuse. Attacks of severe cystitis occurred at intervals for several years, and the diagnosis for renal calculus had been made five years before Mr. Whitehouse was consulted.

He found on cystoscopic examination that the fundus of the bladder was indented, the mucous membrane inflamed, and coated with phosphates. The patient was very fat, but the lower pole of a hard body could be felt in the right anterior quadrant of the pelvis. Laparotomy was performed and the lithopædion removed from the region of the right appendages; there was a good deal of matting of intestines and omentum which caused some difficulty.

The specimen showed the appearances of a typical lithopædion corresponding to a gestation of about three months; the cranial bones, vertebræ, scapula, pelvic girdle and certain digits were all recognizable on the surface. The patient made a good recovery, but five months later died from double pyonephrosis.

The specimen was discussed by Mr. T. G. Stevens, Dr. Herbert Spencer, Sir John Bland-Sutton, and the President.

Mr. BECKWITH WHITEHOUSE read a short communication on

SALPINGOTOMY VERSUS SALPINGECTOMY

in the treatment of tubal gestation. He pointed out that in all cases of tubal mole the attachment of the mole to the tube is small, and that the rest of the mole can be easily detached from the wall. These considerations suggested the possibility of preserving the tube after removal of the mole from the tube *in situ*.

In a series of ten cases he incised the tube, removed the mole and controlled the bleeding by suture, and then removed the tube for examination in detail for evidence of inflammatory change. In all the tissues appeared normal. Since then he has removed the gestation and sutured the tube in five cases with apparently satisfactory results. He thought probably removal of the tube in cases of rupture was the better procedure, but in cases of tubal mole and tubal abortion, salpingotomy appeared to be worthy of a trial.

The paper was discussed by Mr. Stevens, the President, and Dr. Amand Routh.

Mr. JOHN B. HUNTER had a short communication and showed microscope slides on a case of

GENERAL VASCULAR CARCINOMA.

The patient was a woman of 35, who had had six weeks' history of rectal and vaginal pain before admission to University College Hospital under Dr. Blacker. There was no history of bleeding, but there had been rapid wasting. Examination revealed infiltration of the vaginal walls down to the urinary meatus, the cervix appeared nodular, bleeding slightly on examination, but there was no ulceration.

The only treatment thought likely to influence the condition was radium. 200 mg. of radium bromide was inserted into the vagina for 24 hours on September 12, 1921, and ten days later the patient was much more comfortable. On September 22 the pelvis was externally radiated for four hours with 200 mg. of radium bromide. A week later (September 29, 1921) she had very little pelvic pain, micturition was painless, and her foul discharge had almost ceased. She complained of pain in the left chest and between the shoulders, respirations were 35, and she had a slight eruption on the left side of the upper lip; there were no physical signs in the chest.

On October 6, 200 mg. of radium bromide were again inserted into the vagina. Three weeks later respriations were 40—44. Pulse 140. The eruption on the lip looked like a deep nævus. She had a similar condition on the back, abdomen and both palms, but these were smaller and not swollen; she was very cyanotic. The condition of the cervix and vagina showed great improvement. Examination of the chest showed nothing of importance, the blood count showed 4,600,000 red and 16,500 white cells. The patient remained in an exhausted condition, and died 14 days later.

Post-mortem Findings.—The pericardium contained 2 oz. of fluid and the right ventricle was dilated. There was a deposit of growth on the chordæ tendineæ of the mitral valve. The pleura, lungs, spleen and liver contained deposits of growth. Douglas's pouch was closed by adhesions in which growth was present. On cutting the vaginal walls, cervix and lower uterine segment, a tough white fibrosis was apparent. The broad ligaments were thickened; there were no gross glands found in the pelvis, and nothing in the rectum. Microscopically, all the organs examined showed the presence of growth. The vagina and cervix, besides the presence of healthy cancer cells, showed areas where degeneration of the cells had taken place, and new-formed fibrous tissue. In the broad ligaments was widespread growth, some of the vessels were blocked by growth, some had central cores of growth with circulating red cells surrounding them.

In the liver the portal veins were blocked, and beside them the hepatic arteries and bile ducts could be seen free from growth. In the lungs the small vessels were blocked by growth, and in some of the bigger ones larger masses of growth were seen surrounded by red corpuscles. The cancerous vegetation on the heart valve showed the circulatory nature of the growth. The vessels in the nævoid eruption of the lip were choked with growth.

Mr. Hunter thought the peculiar distribution of the growth throughout the vessels of the body justified the term of a general vascular carcinoma.

The paper was discussed by Dr. Blacker, Mr. Forsdike, Mr. Wyatt, Mr. Stevens, and the President.

Mr. Forsdike said dissemination was often thought to be the result of

radium treatment, but he felt that there was no real evidence that this happened, and quoted figures to support his view.

Mr. A. W. BOURNE read a paper on

HYPERTHYROIDISM IN FUNCTIONAL MENORRHAGIA,

of which the following is an abstract.

There is a large class of women suffering from menorrhagia in whom no local signs of disease can be discovered in the pelvis. Clinical examination and curetting of the uterus both fail to reveal abnormality, and ordinary methods of treatment by drugs and organic extracts are useless in arresting the excessive hæmorrhage. A series of cases of this type has been examined with a view to establishing hyperthyroidism as a cause, and defining a variety of functional menorrhagia as due to hyperthyroidism.

Clinical examination of the patients was first made in order to detect those physical signs and symptoms usually associated with hyperthyroidism. The most prominent of these were loss of weight and nervous instability. Others less constantly present were increased pulse rate, slight tremors, and a tendency to sweat easily. Enlargement of the thyroid was occasionally present, but it was more often normal in appearance. Exophthalmos was only present in one case.

The two pieces of evidence supporting the view of hyperthyroidism as the causal factor were firstly, the increased basal metabolism, as determined in all cases by Dr. C. M. Wilson, at St. Mary's Hospital, and, secondly, the reaction of both the basal metabolic rate and the symptom of menorrhagia to X-ray application to the thyroid gland.

(1) Measurement of the B.M.R. (basal metabolic rate) differentiated the patients into two groups, (*a*) those at or about the age of puberty (six cases only), who showed a normal or depressed B.M.R. in five out of the six, in spite of considerable thyroid enlargement in some of them; (*b*) those patients who were sexually mature. These all (fourteen cases) showed a raised B.M.R. of about +20 per cent., the lowest being +14 per cent., and the highest +46 per cent. Three were married, with menorrhagia dating from the last confinement. The uterus in these patients was distinctly smaller than normal. The suggestion is made that the normal hyperthyroidism of pregnancy has persisted with the production of a functional menorrhagia.

(2) The second piece of evidence is the effect of X-ray application to the thyroid gland, carried out by Dr. G. Harrison Orton of St. Mary's Hospital. The second group, sexually mature, reacted after a few doses of X-rays to the extent that eight out of ten had the B.M.R. reduced to within normal limits (−10 per cent. to +10 per cent.), together with the return of normal menstruation, while the two patients whose B.M.R. persisted at a high figure showed no menstrual improvement. In cases where a relapse occurred the B.M.R. rose *parri passu* with the return of menorrhagia.

The group at or about the age of puberty examined after X-ray application are too few, but of the four three have showed no improvement.

The paper was discussed by Dr. Harrison Orton, Mr. Comyns Berkeley, Dr. Gibbons, Mr. Ellison, Dr. Amand Routh, and the President.

Dr. HARRISON ORTON said he had been asked by Dr. Bourne to make a few remarks concerning the X-ray treatment; but he did not think there was a great deal to be said at present. It was certainly not necessary, nor did he think it advisable, to give very large doses.

All the cases described by Dr. Bourne, with one or two exceptions, had

been treated in exactly the same manner, the procedure being as follows: to start with a dose ½B or 5X was given once a week for three doses, the filter being 1 mm. of aluminium and four layers of wash leather. After this, doses of $^{4}/_{5}$B. were given once in three weeks through a filter of 3½ mm. of aluminium and wash leather as before; rays should be hard, not less than 9-10 on the Bauer qualimeter. The average number of doses was about eight.

It is important that no erythema of the skin be produced as this was likely to lead to the formation of telangiectasis in the skin, which may become very unsightly. In one of Dr. Bourne's cases, and in another case of Graves' disease, he had seen a tendency to myxœdema produced after eight such exposures, so he thought it advisable to have the basal metabolism tested again after six exposures; on the other hand, some cases had had considerably more than eight exposures without improvement, so that the amount required seemed to be very variable. He thought it should be remembered, too, that cases of Graves' disease, which had had no X-ray exposures at all, had been reported, in which myxœdema developed subsequently. He had no doubt that the estimation of the basal metabolism would eventually lead to a much more accurate dosage being determined.

Dr. R. A. Gibbons said he would like to ask Mr. Bourne if there was evidence of the enlargement of the thyroid gland in all the cases treated, and if any showed signs of myxœdema after or during treatment by X-ray. From his own experience, he considered the treatment of young girls suffering from menorrhagia difficult, and often most unsatisfactory, and Mr. Bourne was to be congratulated on his interesting paper containing evidence of a method of treatment which, under certain conditions, might prove successful.

Dr. Amand Routh asked if Dr. Bourne had been able to clinically establish the presence of other endocrine glands being affected in his cases. It was believed that all the endocrine glands, including the ovary, acted co-ordinately, and that each was influenced by the internal secretion of the others.

MIDLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

First Ordinary Meeting of the Session, held at the University, Bristol, December 6th, 1921.

Professor Ewen MacLean, the President, in the Chair.

The role played by dilute acids in septic infections.

Professor Walker Hall read a paper on "the rôle played by dilute acids in septic infections." He gave an account of his research on the rôle played by different dilute acids in septic infections, and showed how careful determinations of hydrogen ion concentration were of value in accelerating and retarding growth of micro-organisms, in making blood cultures, and in connexion with developments in some aspects of diphtheria and tuberculous infection.

Fibromyoma of the uterus complicating pregnancy

Professor Walter Swayne showed a specimen of fibromyoma of the uterus complicating pregnancy. The patient was a multipara, aged 43, giving a history of 3-4 months' hæmorrhage. A large cervical fibroid was

felt, and the uterus was palpably enlarged. The case was diagnosed as one of multiple fibroids, and laparotomy performed. It was then found that the enlargement of the uterus was due to pregnancy, but in view of the inevitable obstruction that the fibroid would cause were the pregnancy allowed to go to term, the operation of hysterectomy was completed.

A case of accidental hæmorrhage.

Professor Swayne also showed a section of uterine muscle showing interstitial hæmorrhages.

The patient, who was six months' pregnant, was admitted with profuse bleeding thought to be due to placenta prævia. The uterus, however, was larger than the duration of pregnancy justified, and was tender. There was marked albuminuria. As the uterus was slowly enlarging the abdomen was opened: there was free blood in the peritoneal cavity and macroscopic ecchymoses of the uterine wall. The uterus was opened, but the child was dead. As the uterus would not retract it was rapidly removed, but the patient did not long survive the operation.

Hypernephroma of the right kidney.

Professor MacLean demonstrated a case of hypernephroma of the right kidney presenting some features of interest. This patient, æt. 44, had three children, the last one five years ago: she complained of a swelling in the lower abdomen of about two years' duration accompanied by menorrhagia. On examination a solid, smooth, abdominal tumour was found reaching up to just above the umbilicus and inclining slightly to the right side. It presented the physical properties of a right ovarian tumour but Dr. Maclean had not had the opportunity to verify this for himself. At operation, after laparotomy had been performed, the condition was manifestly renal: it was removed by incising the peritoneum on the outer side of the tumour and peeling it inwards. The pedicle was ligated in two parts and the tumour removed. The uterus was normal but the right ovary was cystic and the tube inflamed: both were removed. The patient made an uninterrupted recovery: she showed no sign of any suprarenal virilism.

After removal the tumour was seen to measure 8½ ins. by 6 ins.: it consisted mainly of greyish tissue in which hæmorrhages in various stages of absorption were present causing patches of red and brown to be seen; also the central part was degenerated and a cavity with ragged irregular walls was present here. On the summit of the specimen was perched a fragment of apparently normal renal tissue like a helmet.

On microscopic examination some fields were seen in which the cells were arranged like normal suprarenal tissue; but more often the arrangement was very irregular and the cells of various shapes. Thin-walled blood vessels were plentiful, and many red blood cells were seen in aggregations. The appearance was of sarcoma.

The specimen was of especial interest in view of Professor Glynn's recent exhaustive paper on these tumours in the "Journal of Obstetrics and Gynæcology of the British Empire," 1921, vol. xxviii, No. 1.

Fibromyoma of the cervix uteri.

Professor MacLean also demonstrated a left-sided fibromyoma of the cervix uteri.

The patient was a multipara, the last child being three years old, while there had been a miscarriage four years ago; the clinical history was of

hypogastric pain and leucorrhœa for three years. She was æt. 43 years, and menstruated normally and regularly.

Examination revealed a hard fibromyoma involving both lips of the cervix uteri and projecting downwards especially on the left side; the corpus uteri was retroverted and the fundus was about 2½ ins. above the symphysis.

At operation pan-hysterectomy was performed, the soft peri-uterine tissues in which lay the ureters being separated by swab pressure. The patient made a good recovery.

The specimen measured 4½ ins. vertically, the small corpus and fundus being planted on a relatively massive cervix which was entirely fibromyomatous and which descended especially on the left side.

The specimen is being kept in the Pathological Museum, King Edward VII Hospital, Cardiff.

Mr. CHRISTOPHER MARTIN (Birmingham), discussing the last specimen, stated that in his experience a safe method of removing such a tumour was first of all to enucleate the fibroid, after which the surrounding shell of cervical tissue would contract away from the soft surrounding tissues and could be then removed without fear of injuring the ureters; but as a specimen the tumour would be destroyed.

Mr. FURNEAUX JORDAN (Birmingham) supported Mr. Martin's claim for ease and safety by this method of removal.

Professor MACLEAN replied briefly.

A CASE OF INIENCEPHALY.

Dr. STRACHAN (Cardiff) demonstrated a case of iniencephaly, the full account of which is published on page 87 of the present number of the Journal.

THORACOPHAGUS TWINS.

Dr. STRACHAN also showed thoracophagous twins; these were united together in the sternal and abdominal regions, thus belonging to the subclass sternophagous.

There had been eleven previous pregnancies, all at full time, all without incident, and all the children being alive now; the only point about this labour was that it was somewhat delayed while the twins were dead on delivery. The sex was male in both cases, and they measured 30.50 cms. and 26.50 cms., the combined weight being 3 lbs. 9¾ ozs.

A single large umbilical hernia was present in the line of fusion with a single umbilical cord attached to the fundus of the sac.

In one twin the left hand showed only two fingers and a long thumb: on X-ray examination three metacarpals were seen, one corresponding to each digit each of which showed the normal number of phalanges. In the same twin the left leg was very shrunken in size, being only ¾ inch long, and when examined by X-rays the fibula was seen to be absent, while the tibia had been curved and twisted round presumably by intrauterine pressure. The placenta had not been sent for examination but was reported normal.

A CASE OF ACUTE HÆMORRHAGIC SUPRARENALITIS.

Dr. R. T. CARR read a short communication on a case of acute hæmorrhagic suprarenalitis. The patient, a multipara, aged 43, was admitted on 1st December with signs and symptoms of intestinal obstruction of three days' duration. She was 8½ months pregnant.

There was acute abdominal pain and persistent vomiting, and no relief or result from enemata. There were no signs of uræmia. Laparotomy was performed on the day of admission, but no mechanical cause of obstruction to the bowel found. The patient died on 3rd December, and a post-mortem Cæsarean section was performed, and a macerated fœtus extracted. On post-mortem examination an acute hæmorrhagic condition of the supra-renals was found, being more marked in the right side; there was sub-acute nephritis of the left kidney and atrophy of the right. The peritoneal covering of the small intestine was slightly hyperæmic. Peritoneal and omental adhesions were found forming a band on the ascending colon about eight inches above the appendix, and causing a V-shaped kink in the bowel; the bowel was patent and showed no dilatation.

Second Ordinary Meeting of the Session, held at Birmingham, January 3rd, 1922.

PSYCHO-THERAPY IN RELATION TO OBSTETRICS AND GYNÆCOLOGY.

Dr. W. A. POTTS read a paper on the above subject.

MYXO-SARCOMA OF THE FALLOPIAN TUBE.

Mr. FURNEAUX JORDAN showed a specimen of myxo-sarcoma of the Fallopian tube. The patient was a woman, aged 47, who had had five children, and who had been flooding irregularly for the past 12 months. On examination there was a tumour in the lower abdomen between the umbilicus and symphysis and spreading to the left. The central part of the tumour felt cystic. The case was thought to be one of multiple fibroids and a subtotal hysterectomy advised. On opening the abdomen a large semi-solid tumour was found involving the uterus; the left tube was thickened and adherent to the uterus, and a thickened mass was felt in the left broad ligament. There were numerous cystic deposits on the pelvic peritoneum and on the tips of the appendices epiploicæ. The uterus and both appendages were removed for arrest of hæmorrhage rather than with any hope of eradicating the disease. The tumour on section proved to be a myxo-sarcoma, and the pathologist was of the opinion that it had originated in the tube.

In connexion with this case Mr. Furneaux Jordan reported the case of a school-girl, aged 16, who was taken ill suddenly one night with profuse hæmorrhage. The local practitioner found a pedunculated mass in the vagina and was able easily to secure the pedicle and remove the mass.

Six weeks later hæmorrhage recurred. Mr. Jordan on seeing the case found the vagina filled with a large mass, which was extremely friable, and bled profusely. This growth proved to be a myxo-sarcoma growing from the cervix—sarcoma botyroides—and total hysterectomy was performed with the removal of both appendages.

Mr. Jordan invited the opinion of the Society on so drastic a treatment in a girl of sixteen.

PELVIC CYST OBSTRUCTING LABOUR.

Mr. Jordan also showed a specimen of pelvic cyst which had obstructed labour. A primipara, eight months pregnant, came up with a history of difficulty of micturition. On examination a cystic mass was felt filling the pouch of Douglas. Mr. Jordan advised Cæsarean section at term. This was duly carried out and a pedunculated parovarian cyst removed. In explanation of his line of treatment Mr. Jordan stated that he did not

advise removal of the cyst when he first saw the patient owing to the obvious disadvantage of exposing her to labour with a very recent abdominal scar. Further, in view of the undoubted fact that the large proportion of cysts complicating labour are dermoids, and having in view the virulent action of the contents on the peritoneum, he did not feel justified in tapping the cyst when labour commenced.

In connexion with this case Mr. Jordan reported a similar case in a woman four months pregnant, who presented herself for examination with a history of abdominal pain and dysuria. On examination a hard central tumour extended up to the umbilicus, and on vaginal examination the pouch of Douglas was filled by a hard tender mass. On opening the abdomen a small fibroid was found in the fundus and another large one in the posterior wall of the uterus. Both were removed, and the pregnant uterus returned to the abdomen. The patient made an uninterrupted recovery and the pregnancy continued.

The PRESIDENT agreed that Mr. Furneaux Jordan had acted rightly in advising the radical operation in the case of sarcoma botryoides. Referring to the case of the cyst obstructing labour he stated that he had had two such cases—both being dermoid cysts. In the one he had done a Cæsarean section, and in the other had tapped at the onset of labour without any untoward sequelæ.

Mr. CHRISTOPHER MARTIN thought that Cæsarean section was the correct line of treatment in these cases, owing to the irritative action of the dermoid fluid on the peritoneum. Referring to the specimen of myxo-sarcoma he thought that the growth was more probably of uterine origin, and not tubal as suggested.

TERATOMA OF THE OVARY.

Dr. H. SHUFFLEBOTHAM showed a specimen of teratoma of the ovary, on behalf of Mr. J. T. Hewetson. The specimen was from a multipara, aged 34, who gave a history of abdominal pain gradually increasing over a period of twelve months and aggravated at the periods. A hard nodular mass was felt in the lower abdomen extending to just above the umbilicus. Bimanually the uterus could not be felt apart from the tumour. At laparotomy the tumour was found to be a growth of the left ovary. It was firmly adherent to the back of the uterus, and many intestinal adhesions were present. The tumour, which weighed $3\frac{1}{2}$ lbs., on section contained isolated cysts, filled with dermoid contents and hair, and some areas of bone. Histologically epiblast was represented by sebaceous glands, hair follicles, epithelial pearls and nerve tissue; mesoblast by non-striped muscle, fat and embryonic connective tissue, and hypoblast by many acini lined by high columnar goblet cells.

PEDUNCULATED FIBROID OF UTERUS WITH TWISTED PEDICLE

Dr. SHUFFLEBOTHAM also showed a specimen of pedunculated subserous fibroid of the uterus with twisted pedicle. The patient was aged 50, and gave a history of attacks of cutting pain in the lower abdomen of three weeks duration associated with flatulence and constipation. On examination a large hard tumour was found rising from the pelvis to just above the umbilicus. At laparotomy many omental and intestinal adhesions were found, and the tumour proved to be a large subserous fibroid attached by a long pedicle to the right cornu of the uterus. The pedicle had undergone three complete twists.

EDINBURGH OBSTETRICAL SOCIETY.

Meeting held on December 14, 1921.

Dr. LAMOND LACKIE, President, in the Chair.

PNEUMO-PERITONEUM OF THE PELVIS IN GYNÆCOLOGICAL DIAGNOSIS.

Dr. LANCE IMPEY read a paper on Pneumo-peritoneum of the pelvis in gynæcological diagnosis. The paper was based on investigations carried out by Peterson and Van Zwalerwenburg of Michigan University Hospital, and was illustrated by lantern slides. Dr. Impey referred to the pioneer work of Weber in 1912 and later of Stein and Stewart who had shown that the introduction of gas into the peritoneal cavity was a safe and useful diagnostic procedure. Carbon dioxide was used in preference to oxygen as being more rapidly absorbed. For a successful result it was essential that the bladder and lower bowel should be empty, and that the photograph might not be obscured by shadows of bowel or omentum the patient was placed in a modified knee-chest position. With the pelvis thus freed of unnecessary shadow-forming factors, an X-ray photograph would show clearly all the pelvic organs.

As regards apparatus and technique Dr. Impey said that no expensive or elaborate apparatus was necessary. An ordinary operating table which could be lowered at one end was used. Carbon dioxide was stored in a commercial cylinder, the flow of gas being controlled by a gas pressure valve, and the quantity injected into the patient accurately measured by an inverted syphon pulsating meter, the pressure under which it passed being indicated by a manometer. For the transuterine route a metal uterine cannula was used, backward escape of gas being prevented by a rubber obturator fitting into the external os. When the abdominal route was chosen the gas was injected by a lumbar puncture needle, the point of election for puncture, unless there were contraindications such as adherent bowel, being in the mid-line two inches below the umbilicus. The abdominal wall, or if the transuterine route was used the cervix and vagina, were prepared by the free use of iodine and the injection made with full aseptic precautions. Numerous tests showed that the gas in ordinary commercial cylinders contained no bacteria.

Except where contraindicated, for example by pregnancy or acute inflammatory conditions of uterus or cervix, the first attempt was made to pass the gas by the transuterine route. If the tubes were patent the gas passed into the peritoneal cavity under a pressure of 30—40, any resistance being shown on the manometer by a rapid rise. The abdominal route was indicated if the pressure rose as far as 200. When approximately 1000 cc. of gas had been injected by either route the patient was placed face downwards in the knee-chest position on the tilting table and supported by thigh pieces and shoulder straps. The table was tilted to an angle of 20° and a series of stereograms taken. In all the photographs the uterus and appendages were clearly shown; in their interpretation the assistance of an expert radiologist was necessary. The fundus uteri was separated from the bladder by the utero-vesical pouch, which normally contained gas. The broad ligaments hung nearly vertical and presented a thin edge to the

ray. Ovarian shadows depended on whether the ovaries presented the surfaces or thin edges to the rays. The bladder was prominent only in proportion to its degree of distension. The rectum was seen as a cylindrical shadow in the hollow of the sacrum. In a chronic bilateral salpingitis the utero-vesical pouch appeared unusually wide, the posterior part of the pelvis being occupied by a large dense mass, the central part by the fundus uteri. Fibroids showed an irregular outline and the mass had a density greater than normal. Several photographs illustrating pathological pelvic conditions were exhibited.

Dr. Impey claimed that by this method pregnancy could be readily recognized at the sixth week, the characteristic feature being the symmetrical enlargement of the isthmus, due probably to the increased blood-supply and early softening of the lower uterine segment.. The uterus showed a characteristic homogeneous shadow, with regular smooth contour, and of a density less than normal. In many other conditions, such as early tuberculous salpingitis, where recognition was difficult by the ordinary methods, pneumo-peritoneum made the diagnosis more clear.